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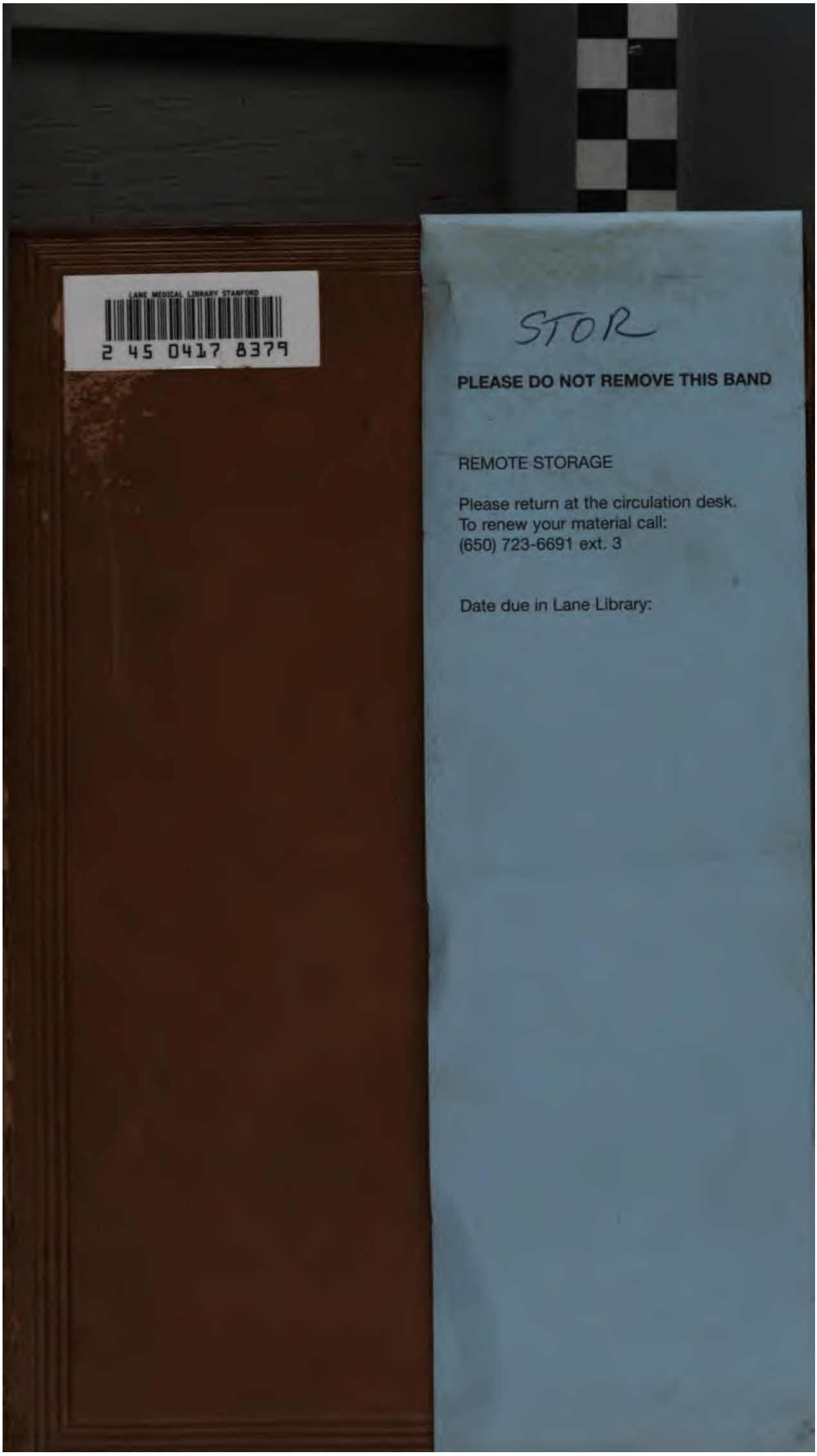
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OF THE

BOARD OF HEALTH

OF THE

HEALTH DEPARTMENT

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HEALTH DEPARTMENT,

No. 301 *Mott street, New York, April 27th,* 1871.

To the HON. A. OAKEY HALL,

Mayor of the City of New York:

SIR:—I have the honor to transmit herewith the Annual Report of the Board of Health of the Health Department of the City of New York, for the year ending April 10th, 1871, with an Appendix thereto.

By order of the Board,

EMMONS CLARK,

Secretary.

BOARD OF HEALTH.

Commissioners.

JOSEPH S. BOSWORTH.
HENRY SMITH.
BENJAMIN F. MANIERRE.
*THOMAS J. BARR.
} *Police Commissioners.*

JOHN M. CARNOCHAN, M.D., *Health Officer of the Port.*

STEPHEN SMITH, M.D.
GIOVANNI CECCARINI, M.D.
MAGNUS GROSS.
JOHN MULLALY.
} *Health Commissioners.*

President.

JOSEPH S. BOSWORTH.

Secretary.

EMMONS CLARK.

Standing Committees.

Sanitary Committee.

GIOVANNI CECCARINI, M.D.
STEPHEN SMITH, M.D.
MAGNUS GROSS.

Committee on Permits.

STEPHEN SMITH, M.D.
JOHN MULLALY.
MAGNUS GROSS.

Committee on Vital Statistics.

GIOVANNI CECCARINI, M.D.
JOHN M. CARNOCHAN, M.D.
STEPHEN SMITH, M.D.

Committee on Street Cleaning.

JOHN MULLALY.
HENRY SMITH.
THOMAS J. BARR.

Committee on Finance.

MAGNUS GROSS.
BENJAMIN F. MANIERRE.
THOMAS J. BARR.

Com'ittee on Law and Ordinances.

MAGNUS GROSS.
JOHN MULLALY.
BENJAMIN F. MANIERRE.

* Appointed Police Commissioner November, 1870, vice Matthew T. Brennan, resigned and elected Sheriff.

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OFFICERS OF THE BOARD.

City Sanitary Inspector and Sanitary Superintendent.
MOREAU MORRIS, M.D.

Health Inspectors.

1. L. Demainville, M.D.
2. Willard F. Deming, M.D.
3. Edward H. Janes, M.D.
4. H. Dewitt Joy, M.D.
5. S. F. Morris, M.D.
6. Philip O'Hanlon, M.D.
7. W. H. B. Post, M.D.
8. Chas. F. Roberts, M.D.
9. Henry R. Stiles, M.D
10. Augustus Viele, M.D.

Sanitary Permit Inspector.
Charles H. Cooper.

Inspector of Street-Cleaning.
Thomas Cottman, M.D.

Register of Records.
Charles P. Russel, M.D.

Deputy Register of Records.
John T. Nagle, M.D.

Attorney and Counsel.
Aaron J. Vanderpoel.

Engineer.
Charles H. Haswell.

Analytical Chemist.
Charles F. Chandler, Ph.D.

Chief Clerk.
George S. Hastings.

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REPORT.

To the Hon. A. Oakey Hall,

Mayor of the City of New York:

The Board of Health, of the Health Department of the City of New York, respectfully transmits its First Annual Report, which includes a review of its proceedings from its organization, April 11, 1870, to the 10th day of April, 1871, being a period of one year.

ORGANIZATION OF THE BOARD.

By the "Act to reorganize the local government of the City of New York" (Chap. 137 of the Laws of 1870), passed April 5, 1870, the City of New York was excepted from the provisions of the Act entitled "An Act to create a Metropolitan Sanitary District and a Board of Health therein for the preservation of life and health, and to prevent the spread of disease," passed February twenty-sixth, eighteen hundred and sixty-six. The same Act (Articles Fourth and Eleventh) creates a Health Department, and declares that such Department shall be a Board consisting of the Police Commissioners of the City of New York, the Health Officer of the Port, and also four officers to be called "Commissioners of Health of the City of New York," who shall be appointed by the Mayor for a term of five years, two of whom must have been practising physicians in said city for a period of five years preceding their appointment.

On the 9th day of April, the Mayor, Hon. A. Oakey Hall, by virtue of the authority conferred by the Act entitled "An Act to reorganize the local government of the City of New York," made the appointments of the Heads of Departments in the government of the Corporation of New York City, as established by said act. On the 11th day of April the Board of Health, of the Health Department, was temporarily organized, there being present for said purpose the following-named Police Commissioners, to wit:—Joseph S. Bosworth, Henry Smith, Matthew T. Brennan, and Benjamin F. Manierre; and the fol-

lowing-named Health Commissioners:—Stephen Smith, M.D., Giovanni Ceccarini, M.D., Magnus Gross, and John Mullaly; absent, Dr. John M. Carnochan, Health Officer of the Port. In the temporary organization of the Board, Commissioner Benjamin F. Manierre was elected President, and Emmons Clark, Secretary. The Board of Health, of the Health Department of the City of New York, succeeded to all the powers and duties of the Metropolitan Board of Health, so far as relates to New York City, and that the necessary business of the Department might continue to be transacted without interruption until a permanent organization was effected, the Board adopted the following resolution:

"*Resolved*, That the several officers, clerks, and employés of the Metropolitan Board of Health, in office and doing duty, respectively, in the City of New York, on the 4th of April, 1870, except the President, Secretary, Counsel, Attorney, Chemist, and Engineer of said Board, be and are hereby transferred to the Health Department created by Chapter 137 of the Laws of 1870, and they are severally hereby authorized and appointed, until the further order of this Board, to perform in and for the said Health Department all the duties, and perform all the services which they were respectively authorized to perform in and for the Metropolitan Board of Health, not inconsistent with, or contrary to the provisions of said Chapter 137 of the Laws of 1870."

The Board was permanently organized on the 27th day of April, 1870, by the election of Commissioner Joseph S. Bosworth as President, and Emmons Clark as Secretary; and during the months of April and May the Board selected and appointed a full corps of officers and clerks in place of those temporarily retained by resolution of April 9th.

ORGANIZATION OF BUREAUX.

On the 27th day of April the Board proceeded to the organization of the Bureaux provided for by Section 91 of Chapter 137, Laws of 1870, and adopted the following resolutions:—

"*Resolved*, That there shall be a Bureau in this department, which shall be called the 'Sanitary Inspection Bureau'; the chief officer of this Bureau shall be called 'City Sanitary Inspector.'

"*Resolved*, That until the further order of this Board, the City Sanitary Inspector is authorized to do and perform, and that he do and

perform the several acts and matters which the Sanitary Superintendent of the Metropolitan Board of Health, on the 4th of April, 1870, was authorized to do and perform, not inconsistent with or contrary to the provisions of Chapter 137 of the Laws of 1870, except such of said acts and matters as the Register of Records may be authorized to do and perform.

"*Resolved*, That there shall be a Bureau in this department, which shall be called the 'Bureau of Records of Vital Statistics'; the chief officer of this Bureau shall be called the 'Register of Records.' In said Bureau shall be recorded, without fees, every birth, marriage, and death, and all inquisitions of coroners (excepting those whereby a jury find a death caused by negligence or malicious injury), which shall occur or be taken within the City of New York. The records and papers of this department, and of the Metropolitan Board of Health, transferred to this department by act and operation of law, relating to the registration of marriages, births, and deaths in the City of New York, shall be in charge of the Register of Records. After the Register of Records shall enter upon the duties of his office, all permits for the removal of the body of any deceased person from the City of New York, for interment, and all burial permits and permits for the disinterment of the remains of deceased persons in the City of New York, shall be granted and signed by the Register of Records."

During the month of May the Board organized the "Bureau of Street-cleaning," and on the 1st day of June appointed a chief officer of the same, called the "Inspector of Street-cleaning." The "Sanitary Permit Bureau" was also organized, as required by law, and on the 30th day of May the Board appointed a chief officer of the same, called the "Sanitary Permit Inspector."

THE SANITARY CODE.

It being the duty of the Board, immediately upon its organization, to cause to be conformed to Article Eleventh of Chapter 137, Laws of 1870, the Code of Laws and Regulations lately adopted by the Board of Health for the Metropolitan Sanitary District, to be called the "Sanitary Code," the Board, on the 27th day of April, adopted the following resolution:—

"*Resolved*, That a committee, consisting of five members of this

Board, be appointed to prepare and report, for the consideration of the Board, such a modification of the code of laws and regulations adopted by the Board of Health for the Metropolitan Sanitary District, and in force on the 5th day of April, 1870, as will conform the same to the Eleventh Article of Chapter 137 of the Laws of 1870, together with such additional provisions for the security of life and health in the city of New York as to them may seem expedient, and to specify such distribution of powers and duties to the members and employés of the Board as to the said committee may seem appropriate."

The committee appointed under the above resolution consisted of Commissioners Ceccarini, S. Smith, Gross, Brennan, and Manierre, and said committee was authorized to secure the services of A. J. Vanderpoel, Esq., as counsel in the consideration of the matters referred to the committee, and in the preparation of the report.

On the same day the Board adopted the following resolution :—

"*Resolved*, That the Rules and Regulations of the Metropolitan Board of Health in force on the 4th of April, 1870, so far as they are not respectively in conflict or inconsistent with the provisions of Chapter 137 of the Laws of 1870, shall be, and are hereby extended to the Health Department and the Board of Health created by last said act, and to the officers, clerks, agents, and employés of said Health Department and of last said Board, so far as they are applicable thereto respectively, until the further order of last said Board." The Rules and Regulations above referred to were referred to the Special Committee on Sanitary Code for such modification and amendment as should seem to be necessary.

On the 18th day of May the Sanitary Code, as reported by the committee, was adopted by the Board, together with the Rules and Regulations as modified and amended. On the same day the Standing Committees authorized by the Rules and Regulations of the Board were appointed by the President.

REVIEW OF THE PROCEEDINGS OF THE BOARD.

The various subjects brought under the consideration of the Board, and the results which have followed, so far as ascertained, will appear from the following review of the proceedings of the Board for the year ending April 10, 1871 :—

1. *Drainage of Vacant Lots.*—This important subject has received due consideration, and under the orders of the Board many vacant lots have been relieved of stagnant water. In cases were nuisances of this character could be abated by street sewers, the attention of the Department of Public Works has been called to the sanitary necessity of constructing sewers in certain streets, and that department has promptly afforded the required relief. In other cases it has been found necessary to order vacant lots to be filled sufficiently to throw the surface water into the street sewers. The most serious difficulty encountered by the Board occurs where the original surface of vacant property is below the street sewers, and the natural water-courses are cut off and obstructed by the construction of public streets. The Board deeming this subject to be of vast importance to the present as well as to the future sanitary condition of the city, on the 20th day of October directed the Sanitary Committee to prepare a report on the value and necessity of a system of drainage for sanitary purposes in the City of New York, and on sanitary engineering in connection with city improvements. From the report prepared by the Sanitary Committee (Appendix K) it appears that it is entirely practicable to relieve the vacant parts of this island from stagnant water, although it may be necessary to apply to the Legislature for additional powers to accomplish that object. That the built-up portions of the city in which the natural water-courses have been obstructed are most liable to malarial and epidemic diseases is a well-established fact, and to relieve such parts of the city from this tendency to disease is a problem worthy of the careful consideration of the most accomplished sanitary engineers.

2. *Street Sewers, Culverts, Pavements, etc.*—Whenever it has appeared from the reports of sanitary officers that the public health would be improved or protected by the construction of street sewers, the Board has directed copies of such reports to be forwarded to the Department of Public Works, with a request for the necessary action. All recommendations of this character have received prompt attention from the Department of Public Works, and the Board acknowledges the earnest co-operation of that department in all efforts for sanitary improvement. Obstructions of sewers and culverts, and defects in street

pavements, resulting in accumulations of stagnant water and filth, have been remedied by the Department of Public Works upon notice from this Board. A large number of orders have been issued upon owners of property to relay sidewalks, and to reset curb and gutter stones to the established grade, thereby abating the many nuisances resulting from the imperfect manner in which the sidewalk, curb, and gutter stones were originally laid.

3. *Street-cleaning.*—The cleaning of the streets is unquestionably of the greatest importance to the public health, and must always receive the attention of the proper authorities. On the 9th day of June, 1865, a contract for cleaning the streets of the City of New York, for a period of ten years, was made by the commissioners appointed for that purpose by an act of the Legislature passed May 1st, 1865, with Messrs. Brown, Devoe, and Knapp. The contractors, for a specified sum, agreed to thoroughly clean all the paved streets and avenues, and all the lanes and alleys, and all gutters, wharves, piers, and heads of slips, once in each week, and to remove all ashes, garbage, rubbish, and sweepings of every kind from the streets, every twenty-four hours, Sundays excepted, and that a few of the principal business streets and avenues should be swept twice or thrice weekly. That the cleaning of certain other streets, especially those which are densely populated by the indigent classes, and during the summer months more frequently than is required by the contract above referred to, is absolutely a sanitary necessity, has been for some years generally acknowledged. To meet this great public want, the Legislature, in Chapter 383, Laws of 1870, authorized this Board to make arrangements with the contractor for cleaning the streets for such additional cleaning of the streets as they should from time to time deem the public health to require. Pending the organization of the Bureau of Street-cleaning, and during the negotiations between the chairman of the Committee on Street-cleaning and the street-cleaning contractor as to the rates for the additional work required, the Board authorized the City Sanitary Inspector to cause those streets to be cleaned daily in which contagious and infectious diseases prevailed, and to thoroughly disinfect the gutters of said streets. The Board also directed the City Sanitary Inspector and the Inspector of Street-cleaning to report the streets and parts of streets needing cleaning more frequently than is re-

quired by the street-cleaning contract. This report was received on the 22d day of June, and the Board on the same day authorized the chairman of the Committee on Street-cleaning to make arrangements with the street-cleaning contractor for additional work at a rate not exceeding $30 per mile for each cleaning of any street, or part of street, cleaned more than three times a week, and not exceeding $35 per mile for each cleaning of any street, or part of street cleaned, three times or less per week. He was also instructed to make *specific* requisitions on the contractor for work, specifying the *exact blocks* of streets to be cleaned and *how often* they were to be cleaned. To secure a thorough daily inspection of the streets cleaned under the old as well as the new contract, the Committee on Street-cleaning was authorized to engage, during the pleasure of the Board, the services of the necessary number of assistant inspectors, to report daily upon the manner in which the work was performed, and any omissions on the part of the contractor to perform his whole duty. On the 28th of June, in answer to a communication from the comptroller of the city, the Board expressed the opinion that $170,000 would be required, and should be raised to pay the expense of extra street-cleaning during the current year, under Section 1 of Chapter 383 of the Laws of 1870, which sum was subsequently increased to $250,000. Under the arrangement above referred to, the streets of New York, during the summer and autumn of the year 1870, presented an appearance of cleanliness unparalleled in the recent history of this city, and unequalled by few, if any, of the large towns in the old or new world. And it is confidently believed that the remarkable health of the city during the extreme heat of the summer of 1870, and the absence of contagious and infectious diseases during that period, was due, to a very considerable extent, to the uniform cleanliness of the streets.

4. *Garbage and Garbage-boxes.*—The removal of garbage from the city is included in the contract for cleaning the streets. The contract requires that all ashes, garbage, rubbish, and sweepings, which may be delivered to the contractor, or that may be placed in barrels, boxes, pails, buckets, or any other vessels, upon the sidewalk or in the front area, or upon the upper area steps of any dwelling-house, store, or public building, shall be removed from the streets in tight carts. To provide against any neglect in the care of the garbage referred to, the

Board has, by ordinance, forbidden that it should be thrown into the streets, and made it the duty of every owner, tenant, lessee, and occupant of any and every building to provide sufficient and suitable boxes, barrels, or tubs for receiving and holding, without leakage, the ashes, rubbish, garbage, and liquid substances that may accumulate within thirty-six hours in such building. The Sanitary Code also requires that garbage-boxes, barrels, and tubs shall not remain upon the sidewalks longer than may be necessary for the removal of their contents, and that no unauthorized persons shall interfere therewith. Some improvement has already been made in the caring for and the removal of garbage; but the subject is surrounded with difficulties, and stringent regulations in relation thereto are not easily enforced unless citizens realize the sanitary value of such regulations, heartily comply with their provisions, and co-operate in their enforcement. On the 12th of July, 1870, the ordinances on this subject were so amended as to require that the ashes and rubbish should not be placed or kept in the same vessel with garbage and liquid substances. The purpose of this amendment was to cause the separation of the ashes from the liquid and vegetable portion, with a view to render both parts useful; for while the substance first named can be safely and properly used in filling streets and vacant lots, the latter can be transported to neighboring and sparsely populated districts, and there utilized without offence. The danger to the public health, present and prospective, to be apprehended from the use of garbage in filling sunken lots and streets will thus be entirely avoided. The failure to enforce this ordinance is partly due to the want of facilities on the part of the contractor for the removal of garbage in the manner intended, but it is expected that such facilities will soon be provided.

5. *Wharves and Piers.*—The condition of the wharves and piers, which has heretofore been a subject of complaint by the sanitary authorities, has been much improved during the present year by the new Board of Docks, organized under Chapter 137 of the Laws of 1870. By the removal of the obstructions which for many years have been allowed to accummulate upon the wharves of the city, the contracter has been enabled to clean the piers and bulkheads as required by law, to the great convenience and comfort of increasing

commerce and of the travelling public. The Board of Docks have also repaired many of the old and decaying piers, which were believed to be sources of disease to the surrounding districts. And when applied to by this Board, the same department has dredged the slips in which decaying animal and vegetable matter had accumulated from the discharge of sewers, and from places of business in the vicinity.

The contemplated improvements of the water-fronts of the city by the Department of Docks will prove to be of incalculable sanitary importance. The old and dilapidated wooden structures which now surround the business portions of New York, form a vast network within which the sewage of the city, composed of house and privy filth, the refuse of slaughter-houses, workshops, and manufactories accumulates, and together with the waste of commerce and the constant influx of sediment from adjacent shores, forms a stratum of putrescible organic matter of great depth and extent. By the movements of the tides and of the vessels, this vast bed of filth is constantly agitated, its elements intermixed, and the process of decomposition thereby hastened. The result is apparent to those who frequent the docks in the summer season, in the escape of immense quantities of the most offensive and deleterious gases. Not unfrequently laborers along shore are compelled to leave their work, so offensive and sickening are these odors. The effect of these malarious emanations upon those whose business confines them much to the docks and the vessels at the wharves is most disastrous; in the summer and autumn severe and fatal forms of fever and diarrhœal diseases are prevalent. The history of many epidemics in New York shows that they either originated about the docks, or manifested the greatest virulence among those whose dwellings are in their vicinity. The effect upon the public health, also, of the constant diffusion of such volumes of noxious gases from a large portion of the water-front, is most injurious. Many outbreaks of fever, dysentery, and similar diseases, in the more central districts of the city, have been regarded as excited or greatly aggravated by this source of contamination of the air.

The only remedy against these sanitary evils is a system of docks such as are now projected, made of imperishable material, with a water-front presenting a smooth surface to be thoroughly flushed by the tides, and from which all accumulations from sewers and other sources are constantly removed.

6. *Inspection and Survey of Tenement Houses.*—The thorough sanitary inspection of the tenement houses of this city, commenced by the Metropolitan Board of Health in the year 1869, was not completed until the spring of 1870. Every building containing more than three families was visited by the inspectors and examined from attic to cellar, and blanks prepared for that purpose were filled with all the material facts in respect to the sanitary condition of every part of the building, and the health and social condition of the occupants. During this survey all nuisances discovered were reported in regular form, and were subjects for orders of the Board; and all violations of the "Tenement House Act," and cases of non-compliance with said act, were, after due notice, prosecuted by the attorney, in the name of the Board, for the penalty imposed by law. These decisive measures have resulted in the improved ventilation, sewerage, and general cleanliness of tenement houses, and have materially aided in preserving the health and promoting the comfort of an important portion of the city population during the remarkable heat of the last summer.

The Register's report shows a most gratifying improvement in the health of the inhabitants of tenement houses. Although less than one-half the total population of New York occupy tenement houses, yet nearly 76 per cent. of the total mortality occurred among this class in 1868; in 1869 it fell to 68 per cent., and in 1870 it was reduced to about 66 per cent., a gain of 9½ per cent. in three years. This gives a saving of 2,600 lives. No better illustration of the value of sanitary work could be desired. This remarkable reduction in the death-rate of the inhabitants of tenement houses has followed directly upon a most thorough inspection and reconstruction of these dwellings of the poorer classes.

The reinspections of tenement houses made during the present year have resulted in establishing the fact that greater care is observed by owners, lessees, and occupants in respect to the sanitary condition of this class of buildings, and that this improvement is mainly the result of the constant efforts of the health authorities to secure this necessary and important reform. Many new structures for the accommodation of a large number of families are constructed with all the modern appliances for ventilation and sewerage, and intelligent owners of property find it to be to their own interest to give good accommodations to the poor, and to demand care and cleanliness on the part of their tenants.

The results of the systematic survey and inspection of tenement houses above referred to are preserved in twenty-five bound volumes, which are constantly open to the examination of the inspectors, aiding them in their duties and proving invaluable for reference. To preserve the lives and health of those who are obliged by circumstances to occupy the densely-crowded sections of the city, must continue to be one of the most important duties of this Board.

7. *Cellars and Underground Rooms.*—The permits granted by the Metropolitan Board of Health to occupy cellars and basements for human habitations having been revoked by this Board, new applications for permits were made in due form, the premises were inspected by the Health Inspectors, and upon the recommendation of the City Sanitary Inspector new permits have been from time to time granted or denied by the Board. In some cases cellars heretofore occupied have been ordered vacated, and in a large number permits have been withheld until improvements had been made in the ventilation and drainage of the premises. The scarcity of proper accommodations for the indigent, and the want of cheap and rapid transportation to suburban districts, seem to render it necessary to tolerate the occupation of rooms partly underground as human habitations. To compel the vacation of all such premises results in pauperizing the occupants. But while the occupation of such places of abode is permitted, the utmost care and watchfulness are demanded from the corps of inspectors to preserve the health of those who are compelled to live in these humble quarters, by securing to them the greatest amount of light and air, and the most perfect sewerage and drainage. The Board fully appreciates its duty in this particular, and does not hesitate to cause cellars to be vacated wherever, by reason of contagious disease or the violation of the terms of their permits, such a course seems to be advisable or necessary.

8. *Houses Dangerous or Unfit for Human Habitation.*—At various times during the year the Board has ordered houses to be vacated, pursuant to Section 11, Chapter 908, Laws of 1867, upon the certificate of the Sanitary Superintendent that said houses were, by reason of want of repair, unfit for human habitation. Copies of the reports of its inspectors upon the dangerous condition of buildings, by reason

of old or defective walls, unprotected or dilapidated stairways, or from want of fire-escapes, have been from time to time forwarded to the Department of Buildings, with a request for the necessary action in the premises, and have received prompt attention.

9. *Stables.*—The attention of the Board has been constantly directed by its inspectors to the condition of stables for horses, and a large number of orders have been issued for the improvement of such premises. By the construction of connections with sewers, and of proper manure vaults, and by the enforcement of the ordinance for the prompt and frequent removal of the manure, the principal causes of complaint against this class of establishments are removed. A complete survey of all the stables in the city has been made by order of the Board, and the report of the City Sanitary Inspector on this subject will be found in the Appendix (M).

Cow stables are few in number, and, when permitted within the city limits, are subject to a constant supervision requiring the utmost cleanliness and thorough drainage.

10. *Stable-manure.*—The constant demands from neighboring districts for manure for fertilizing purposes prevents any objectionable accumulations of this material in the stables of this city. But it is the pecuniary interest of dealers in this article to store it upon vacant lots in the city until such times in the year as the demand from farmers and gardeners is most brisk, and the highest prices can be realized. The straw and coarser parts of the manure also increase in value by such storage, while the cost of transportation of manure that is fully prepared and is fit for immediate use is materially less. Besides, during the winter months the removal of manure is sometimes difficult on account of ice in the rivers, and particularly in the waters adjacent to the points where this article usually finds a market for consumption. To preserve this city from the nuisance likely to result from the storage of manure upon this island, and at the same time avoid unnecessary interference in the legitimate business of a large number of citizens, has been the aim and effort of this Board. In the autumn of 1870 the Board granted a few permits for the storage of manure in such localities only as were believed to be so far removed

from the densely populated portions of the city that no injury could result to the public health. It also granted permits for its removal from the built-up portions of the city, provided the manure was dumped from carts directly into boats for its immediate removal from the city, subject to the Sections 106 and 107 of the Sanitary Code. So numerous, however, were the complaints against the several places where manure was stored during the winter, which complaints upon investigation proved to be well-founded, that the Board, in March, 1871, revoked all permits for storing manure, and ordered all accumu lations of that article to be removed before the first day of May. Upon an elaborate report of the Sanitary Committee, the Board adopted as its policy in respect to this difficult subject, to grant permits to dump manure "only from carts directly into boats for its immediate removal from the city," and designated such piers as are most suitable and conveniently located for the transaction of the business. (See Appendix K.)

11. *Removal of Dead Animals.*—On the 8th day of April, 1865, a contract was made by the City Inspector with the "Long Island Bone Laboratory," for the collection and removal of dead horses and other dead animals, blood, offal, and other refuse matter, from the city of New York, for a period of ten years. The dock at the foot of West Thirty-eighth Street was designated as the place for receiving dead animals, offal, etc., and the contractor agreed to provide and keep at said dock a sufficient number of suitable vessels for receiving the material, and to transport and to convey the same, at least once in each day, out of and beyond the limits of the city. In consequence of the large accumulation of offal, and dead animals in all stages of decomposition, and the delay in the removal of the same, this dock became a most offensive nuisance, and in the year 1867 a company, called "The New York Rendering Company," obtained a transfer of the contract, with the view of utilizing the material and suppressing the nuisance. The apparatus used by this company was located upon vessels lying at the dock at the foot of West Thirty-eighth street, and its operations were generally approved by the sanitary authorities. But the complaints from citizens in respect to the offensive odors caused by the New York Rendering Company were constant, and were the subject of frequent

investigations. Upon the organization of this Board in April, the Company applied for a permit to continue its business in the same manner and at the same place; but after a thorough consideration of the subject by the Sanitary Committee, the Board decided that a permit should not be granted, and ordered that the business should be suspended. Since that time the removal of dead animals and offal has been performed as required by the contract made in 1865. It is but just to the New York Rendering Company to state, that its officers have always manifested an earnest desire to conduct the business of "rendering," without offence, and a willingness to adopt any measure to that end, without regard to the expense. They have always claimed, and still claim, that their apparatus effectually consumes all offensive gases, and that the foul odors complained of in the vicinity of the foot of West Thirty-eighth street originate from other manufacturing establishments in that locality.

12. *Removal of Night-Soil*—A contract was made on the first day of May, 1865, by the City Inspector, with Thomas Andrews, for a period of ten years, to receive from the night scavengers the night-soil of the city, and to deliver the same to the "Lodi Manufacturing Company" at its factory on the Hackensack river. Under this contract the work was performed, to the satisfaction of the sanitary authorities, until June, 1870, when notice was received by this department from the parties representing the contractor, that the boats for receiving the night-soil would be withdrawn, and that work under the contract would cease on the eleventh day of that month. The failure and neglect of the contractor to remove the contents of the sinks and privies of the city, and the consequent danger to the public health, demanded prompt and efficient action. The Board, on the 22d day of June, authorized the City Sanitary Inspector to employ, from day to day, any discreet and responsible person or persons, having sufficient facilities to receive, retain, and transport, during such day, all the contents of sinks and privies brought nightly by the scavengers' carts, as required by the original contract, at an expense not exceeding a sum per day to be approved by the Finance Committee, to be paid by the Comptroller of the City of New York out of funds in his hands appropriated for that especial purpose. The power to make such daily contracts was to cease

when the executors of the contractor, Thomas Andrews, deceased, should again lawfully resume the execution of the contract, or whenever the Board should direct that no more work be done under its authority. With the approval of the Finance Committee, the City Sanitary Inspector contracted with responsible parties for the removal of the night-soil for the sum of $150 per day, and this work has been performed satisfactorily from day to day, the representatives of the original contractor not having resumed the performance of the duties required by his contract. Licenses have been granted from time to time to such night scavengers as could present for inspection proper carts and appliances for the transaction of the business. Rules and regulations for the government of scavengers, specifying in detail the manner in which their work shall be performed, and the rates to be charged, have also been adopted by the Board, and by means of frequent and careful inspection the rules have been enforced. Reports of delinquencies of scavengers have been referred by the Board to the Committee on Permits, for investigation, and, when found correct, the delinquents have been fined or their licenses revoked. It is confidently believed that an important reform has been accomplished in this branch of the public business, as the complaints of neglect and extortion, formerly so frequent against night scavengers, have almost entirely ceased.

13. *Swill and other Refuse Matter.*—To abate the nuisance caused by the transportation of swill and other refuse matter from the city, the Board, on the 22d day of June, adopted an additional ordinance requiring that hotel or house swill, or garbage, or offensive material of a liquid nature, or partly liquid, not removed or required to be removed by the contractor for street-cleaning, shall not be transported along or through any street of the city of New York except in tightly covered iron-bound casks or boxes, and that none of the contents of such casks or boxes shall be allowed to fall or leak or spill therefrom. The Board has also required parties engaged in this business to present their carts and receptacles for inspection, and has issued permits to such persons as have the proper facilities for performing their work in an inoffensive manner.

14. *Slaughtering of Animals.*—All permits for slaughtering animals

in the City of New York granted by the Metropolitan Board of Health having been revoked, this Board caused a careful inspection to be made of all existing slaughtering establishments, and the reports of the inspectors were referred to the Sanitary Committee for further examination and consideration. To those slaughter-houses already located and in operation above Fortieth Street permits to continue the business were granted whenever it was ascertained that due attention was given by the proprietors to the cleanliness, to the drainage, and to such other measures as are necessary in conducting the business. The whole number of permits for slaughtering granted by this Board is 34: of which number 19 are for slaughtering cattle, 5 for swine, and 10 for sheep and calves. The number of slaughter-houses in the city of New York is constantly decreasing, and the business is gradually concentrating in large establishments or abattoirs. This Board has not encouraged the establishing of new slaughter-houses, unless upon a large scale and with sufficient capital to transact the business with all the modern improvements and appliances, and with the facilities of utilizing upon the same premises the fat and other parts of the animal not used for human food. If the slaughtering of animals, the melting of fat, and other business pursuits connected therewith were concentrated in a few large establishments, well constructed and carefully managed, it is believed that the various nuisances complained of as result ing from such business pursuits would practically disappear. To relieve the central part of the island from the nuisance of cattle driving and from slaughter-houses, the Board, on the 6th day of September, adopted an additional ordinance prohibiting the slaughtering of animals at any place between the Second and Tenth Avenues, from and after December 1, 1870. It having been reported that diseased and dying cattle are sometimes sold at the cattle yards and are slaughtered for human food, the Board, on the first day of November, authorized the City Sanitary Inspector to employ a suitable person to act as an Inspector of Cattle at the cattle yards in the city. Through the Sanitary Company of Police a daily inspection is made of all meats offered for sale in the markets, and seizures are frequently made of such as are unfit for consumption.

15. *Fat and Lard Melting.*—Soon after the organization of this

Board all permits for rendering fat and lard in the city of New York were revoked, and the whole subject received a careful consideration. On the 9th day of July, the Board adopted an additional ordinance, prohibiting the melting or rendering of fat, tallow, or lard, except when fresh from the slaughtered animal, and taken directly from the places of slaughter in the city of New York, and in a condition free from sourness and taint, and all other causes of offence at the time of rendering. The ordinance further provides that all melting and rendering shall be in steam-tight vessels, the gases and odors therefrom to be destroyed by combustion or other means equally effective, and that the premises where the same is conducted must be free from all offensive odors, and other cause of detriment to the public health. The bringing of fat, lard, or tallow (except as a part of the living animal), into the city of New York, to be melted or rendered, and the melting or rendering of the same, are also prohibited. On the 5th day of July the Board directed the City Sanitary Inspector to notify all persons interested in the fat and lard melting business of a "hearing" before the Sanitary Committee, in order to present their views, verbally or in writing, as to the best mode of carrying on said business, and in locations which cannot be objected to. This hearing resulted in the conclusion that a distinction must be made between the rendering of fresh lard, which is used as an article of food, and which, if not melted when fresh, loses a considerable part of its value, and the melting of fat or tallow, which, as an article of commerce, does not depreciate so materially if sour or tainted. Permits were therefore granted, subject to the ordinance above referred to, "to melt or render fresh lard, provided such fresh lard is taken from the slaughtered animal upon the premises where it is to be rendered." The Board refused to grant permits to melt fat or tallow at any place within the built-up portions of the city.

16. *Other Offensive Trades.*—In addition to the various kinds of business connected with the slaughtering of animals, which, if carelessly or improperly conducted, are liable to be complained of, the attention of the Board has been called to other manufacturing pursuits located in the crowded parts of the city, as being detrimental to the public health. Among these may be mentioned all factories emitting large quantities of smoke, which enters the neighboring tenements and is injurious to

the weak and invalid, if not to those in health, and which deprives the inmates of fresh air, and compels them to keep their doors and windows constantly closed. As it is a fact well established in older cities that this nuisance can be abated at small expense, the Board has adopted an ordinance that from and after the 1st of June, 1870, every furnace employed in the working of engines by steam, or in any mill, factory, printing-house, dye-factory, iron-foundry, glass-house, distillery, brew-house, sugar-refinery, bakehouse, gas-works, or in any other buildings used for the purposes of trade or manufacture, shall be so constructed as to consume or burn the smoke arising therefrom, unless a permit to the contrary be obtained from this department. Under this ordinance many nuisances of this character have been abated. Complaints have also been entered by the Health Inspectors against the plaster and lime mills of the city, it being claimed that the dust from said mills enters all dwellings in their vicinity, and is detrimental to the health and comfort of the people.

17. *Cows, Swine, and Goats.*—The keeping of cows, swine, and goats in the built-up portions of the city has been almost entirely discontinued, and permits have been granted for such purpose only after thorough inspection and careful consideration in each case. In the upper and sparsely-populated part of the city, the Board has granted permits to keep the animals above-named, subject to the regulations of the Sanitary Code, wherever, by reason of the absence of dwellings in the vicinity, no danger to the public health seemed likely to result therefrom. Permits for keeping milch cows have been granted only in cases where the proper care is taken in respect to the ventilation of the stables, the kind and quality of food, and to such other particulars as are necessary to the health of the animals. It is not known to this Board that there are any milch cows upon this island which are fed upon distillery swill, or other substances claimed to produce disease, or to impair the quality of the milk furnished to the people.

18. *Chemical Inspections.*—On the 22d day of June, Prof. Charles F. Chandler was appointed Chemist to this Department, and was directed to continue the investigations of milks, foods, Croton water, and kerosene, undertaken by the Metropolitan Board of Health.

The amount and character of the work performed by the chemist is detailed in his Annual Report. (See Appendix G.)

19. *Explosive Burning Fluids.*—On the 22d day of June the Board adopted an additional ordinance prohibiting the keeping, the exposing, or offering for sale, and the selling or giving away, as a burning fluid, any petroleum oil, kerosene oil, or other liquid having like composition or qualities as a burning fluid, unless such oil or fluid shall be of such quality and ingredients that it shall not evolve an inflammable vapor at a temperature below one hundred (100°) degrees of the Fahrenheit thermometer. By frequently submitting to a chemical analysis samples of burning fluids purchased in different parts of the city, and by legal prosecutions whenever the ordinance was violated, it was believed that the quality of the oil sold for this purpose would be improved, and that many of the deaths caused by its explosion would be prevented. But, subsequently, one of the Courts decided that the Board of Health had no jurisdiction in the matter of the sale of adulterated burning fluids, and from that time its action has been limited to obtaining such information in regard to the trade, through the investigations of the chemist, as, when published, would be of importance to the public, and aid, indirectly, in suppressing the traffic in dangerous kerosene. In order to render the information serviceable, the Board directed the chemist, on the 28th of March, to embody his investigations in a report, to be published in the Annual Report. The report of the chemist (see Appendix L) contains a full statement of the methods of manufacturing kerosene and all the circumstances attending its adulteration.

While there has been a manifest improvement in the quality of the kerosene since investigations have been made of the articles sold by various dealers, and this information was published, yet the casualties which almost daily occur from its use show how largely the market is still supplied with an adulterated and dangerous burning fluid.

20. *Manufacture of Illuminating Gas.*—The efforts of the sanitary authorities have secured a marked improvement during the past few years in the methods of manufacturing illuminating gas, and complaints of offensive odors from these establishments are now rarely received. Since the last report upon this subject, the "Metropolitan Gaslight

Company" has introduced the "iron process" of purification with complete success. The "New York Company" had previously adopted the same process with excellent results, while the "Manhattan" has so perfected its "dry-lime process" as, in the opinion of the chemist, to be no longer a nuisance.

21. *Disinfection and Disinfectants.*—During the present year the Board has maintained an efficient "disinfectant corps," which, under the general direction of the city Sanitary Inspector, has been actively employed in the purification of premises where contagious diseases prevailed, and in rendering innocuous all kinds of organic matter not promptly removed. The value of disinfection having been fully established by different sanitary authorities, and the kinds of disinfectants best adapted to the various forms of putrescent matter and for the purification of clothing and dwellings having been decided upon, after making the proper chemical tests, the Board has not hesitated to approve all requisitions for disinfectants and to encourage their liberal use. Filthy gutters in the tenement-house districts have been cleaned and disinfected, and it has been made a part of the duty of night scavengers to disinfect all privies and the contents thereof at the time such contents are removed. In the treatment and care of contagious diseases, disinfectants have been employed by the officers of the Board with the most satisfactory results. The rooms and houses where such diseases prevailed have been fumigated; when necessary, the clothing and bedding have been cleansed and disinfected, and all discharges and sources of foul emanations about the sick have been disinfected or destroyed. And the Board is fully convinced that an efficient and intelligent disinfectant corps, and the liberal use of disinfectants, are most valuable auxiliaries in preserving the public health and preventing the spread of disease.

22. *Care of Contagious Diseases.*—In addition to the use of disinfectants in the care of contagious diseases as above referred to, the policy of the Board has been, as far as possible, to isolate the sick by their removal to the hospitals, unless they can be properly cared for and isolated at home. In cases of cholera, small-pox, relapsing, typhus, typhoid, and yellow fevers, unless provided with good homes and proper care, the patients are removed to the Small-pox and Fever Hospitals.

Relapsing fever prevails uniformly among the very indigen and the homeless, and the removal of the patients is a positive necessity. The removal is made upon notice from this Board by the Commissioners of Charities and Correction, who have provided ample accommodations and suitable facilities for that purpose. Resistance is rarely made to such removal, and is generally overcome by the persuasion of the Health Inspector. In a few cases during the past year, when the health and lives of inmates of large tenement houses were endangered, the City Sanitary Inspector was obliged to compel the removal of small-pox patients. The Board has provided suitable ambulances for the removal of patients in such cases, and in all other circumstances where, for any reason, the Commissioners of Charities and Correction are not called upon to act. In small-pox cases the vaccination and revaccination of all persons in the building and immediate vicinity is the practice of the Board.

The failure of physicians to report promptly cases of contagious diseases to the Board, frequently results in the spread of contagion before its existence is known to the officers of the Board. This neglect is to be attributed generally to the carelessness of the attending physicians, many of whom fail to appreciate the importance of preventive measures, and the value of the aid of sanitary officers in limiting and arresting the progress and spread of contagion. Whenever physicians are known to have violated the sanitary code in this particular, the Board has ordered suits to be commenced for the penalty. That the physicians of the city may not be ignorant of this important duty, the Board has directed the City Sanitary Inspector to forward to them printed notices, containing the sections of the sanitary code relating to this subject, and defining what are considered to be *contagious diseases* by this department.

The experience of the Board, in its efforts to control the spread of contagious diseases during the prevalence of relapsing fever and small-pox, not having proved satisfactory, the Sanitary Committee was instructed, on the 6th of March, to examine the methods at present employed, and the location, capacity, and management of the hospitals devoted to this class of the sick, and report what action the Board should take to render its work more effective. The committee reported (see Appendix K) that the methods pursued by the Board against the spread of contagious diseases were of the most approved character,

and, when the measures were fully carried out, gave the most satisfactory results. But there were serious obstacles to the thorough application of preventive measures, and these must be overcome before the community would reap their full value. The first obstacle mentioned was the inefficient sanitary care of those sick persons who were allowed to remain at home in the care of friends and an attending physician. The committee did not think that, in the present state of popular enlightenment as to the nature of the poison of contagious diseases and the value of preventive measures, the Board could enforce any more stringent regulations against this class of persons.

The second obstacle noticed was the imperfect control which the Board had of the sick poor, who were proper subjects for hospital care When removed from their homes these persons are delivered to the Commissioners of Public Charities and Correction, and placed in hospitals under their charge. These hospitals, when inspected, were found to be inadequate in capacity, and seriously defective in sanitary appliances and precautionary measures, both in their external and internal management. In view of these facts, the committee concluded that the interests of the public health required that the Board of Health should have the exclusive control of all persons sick of contagious diseases who are sent to hospital, and recommended that the Board take the necessary steps to enable it to provide hospital accommodations for this class.

23. *Small-pox.*—This disease exhibited a marked tendency to become epidemic in New York during the year. Notwithstanding the very thorough vaccination that had been practised in 1869, throughout the tenement-house districts, the year 1870 opened with a large increase of cases, especially in the 11th, 17th, 18th, and 19th Wards. In addition to the work of vaccination by the corps of inspectors, the Board caused notices to be posted throughout the city announcing that gratuitous vaccination might be obtained at the different dispensaries, and giving information as to their location and the hours of attendance. The number vaccinated was thereby largely increased, and the progress of the epidemic was, for the time, arrested. But meantime this disease was very prevalent in other cities having constant communication with New York. Many of the seaport towns of Europe suffered severe and

prolonged epidemic attacks, and emigrant vessels frequently arrived in this port with cases of small-pox on board. During the latter part of the year 1870, and the early part of 1871, small-pox appears to have attained an almost world-wide prevalence. It not only became epidemic in many parts of the United States and in European cities, but in many cities and provinces of Asia and South America, and in the islands of the Pacific, and it prevailed with great and unusual severity. Towards the close of the year the epidemic tendency of small-pox began to be exhibited again in New York. The cases reported were widely scattered, but sufficiently numerous to prove the necessity of vigorous measures to keep it under control. The number of inspectors was largely increased, and every case was promptly isolated, either at home or in hospital, and vaccination was again practised throughout the tenement houses. The epidemic at no time assumed such alarming proportions as in many other cities, and towards the close of the first quarter of 1871 began to decline rapidly.

This extraordinary prevalence of small-pox over various parts of the globe, especially in countries where vaccination has long been efficiently practised; its occurrence in its most fatal form in persons who gave evidences of having been well vaccinated, and the remarkable susceptibility of people of all ages to successful revaccination, are new facts in the history of this pestilence which must lead to a reinvestigation of the whole subject of vaccination, and of its claims as a protecting agent. There can be no doubt that there is a growing skepticism in the public mind as to the real value of vaccination, and this skepticism has been much strengthened by the repeated occurrence of small-pox, during the past year, in persons who were presumed to have been properly vaccinated. But the medical profession, and especially the more advanced students of contagious diseases, hold firmly to the faith of Jenner, that vaccination is a sure preventive of small-pox when the individual is brought completely under its influence.

24. *Yellow Fever.*—Yellow fever appeared within the limits of this city during the summer and fall of 1870. This was its first appearance in New York since 1822, nearly half a century ago. The outbreak occurred among the troops and residents of Governor's Island, in the early part of August. The island has long been a military station,

and is under the exclusive jurisdiction of the United States. Its to
population at the time of the outbreak was upwards of 800, consisti
of troops and camp followers. It has its own hospital and burvi
ground, and makes no returns of sickness or deaths to the Health I
partment of New York. No knowledge of any unusual sickness up
the island was received by the Board of Health until Septemb
when three deaths occurred in New York, in succession, among p
sons who had attended a wake and funeral upon the island. In t
one of these cases was an autopsy made, and that was so imperfec
returned as to lead to no positive results. The deaths were regard
as probably due to poisoning, and an inquiry was instituted
the City Sanitary Inspector to ascertain the circumstances atte
ing these deaths. It was then ascertained that there had been c
siderable sickness among the residents of the island for a mon
previous, which was regarded by the surgeon of the post as a seve
form of intermittent and remittent fever. The history of this sickn
was not so definitely obtained by the inspectors who visited the isla
as to render the diagnosis certain, though the question of the possibili
of its being yellow fever was raised. Another case occurring so
after in New York, after exposure on the island, was carefully examin
and decided to be yellow fever; and an inspection of the recent cas
on the island, by Special Inspector Dr. J. C. Nott, confirmed the opini
that the prevailing sickness was yellow fever. The Board immediate
took measures, in connection with the health officer, to have the si
removed to Quarantine, and recommended that a strict quarantine
the island be maintained by the military authorities. In order to sa
the remaining troops and residents from an attack of the fever, t
Board, on the 8th of October, advised the Medical Director of th
Military Department to take such measures as would immediate
cause an entire evacuation of Governor's Island of all its garrison, a
other residents, save only such number as might be absolutely necessa
for the protection of property left thereon, and in effecting the evacu
tion the following measures were recommended:—All clothing the
worn by the garrison, all bedding and other textile fabrics then upo
the island that might have become infected, should be left upon it an
undergo a process of disinfection by steam heat. The old woode
buildings known as the "Campwomen's Quarters," and the "Row,

situated near the " South Battery," should be torn down and burned, and the basements or cellars under them filled up to a level with adjacent grounds. The Board also advised that Governor's Island remain vacated as a garrison for troops, and under strict quarantine restrictions, until, in the judgment of this Board and of the Medical Director of this Military Department, the public health could not be endangered by the reoccupation of said island. These recommendations of the Board were not complied with, and, as a consequence, the fever prevailed until the activity of the poison was destroyed by frost, and 200 of the 800 residents had been attacked by the disease.

This occurrence of yellow fever in a severe and fatal form in the precincts of New York, after an absence of nearly half a century, is instructive, and deserving of the most serious consideration. In the first years of the present century yellow fever annually devastated New York, and as late as 1822 prevailed as a most fatal epidemic. Since that period it has so rarely extended beyond the limits of quarantine as to have created the impression that in this latitude it will not again exhibit an epidemic tendency. The outbreak upon Bay Ridge in 1856, and the extreme fatality of the disease among the residents of that locality, and the occurrence of the epidemic of last summer upon Governor's Island, prove conclusively that New York enjoys no special immunity from yellow fever in its worst form. In order that the lessons to be learned from the outbreak of this pestilence in the harbor of New York may be thoroughly understood and made available to the department, the Board instructed Special Inspector Dr. J. C. Nott, a gentleman whose large experience in the epidemics of yellow fever in southern cities rendered his services especially valuable, to report upon the causes of the outbreak upon Governor's Island, the liability of New York to its reoccurrence, and the sanitary precautions necessary both to avert the pestilence and to control it if it should occur. The instructive report of this gentleman (see Appendix I) shows conclusively that New York is as liable to an epidemic of this pestilence as formerly, and points out the preventive measures which will prove most available. The experience of this Board on the outbreak of an epidemic at a military post, in immediate and most dangerous proximity to the city, and over which it had not the slightest sanitary or police control, suggests the necessity, in the interests of the public

health of the city, that military commanders at stations near to, or within the limits of the city, should be required to report promptly all contagious diseases to the Health Department, and to enforce all sanitary regulations made by the Board of Health.

While the military authorities have generally exhibited marked courtesy to the officers of this Board, and manifested an earnest desire to co-operate in enforcing needful sanitary regulations, yet a marked exception occurred in the case of the epidemic on Governor's Island (see Appendix I), which, under other circumstances, might have placed the city in great peril. Such contingencies can only be prevented by an order from the War Department at Washington, making the health ordinances and regulations of the city paramount to all military regulations.

25. *Relapsing Fever.*—The past year was rendered memorable by the appearance of relapsing fever in New York. This was the first recognized appearance of this fever in this city, and its phenomena attracted much attention from the medical profession, while the sanitary aspects of the epidemic were carefully studied by the medical officers of this Board. Although the fever was not recognized until January, it had, undoubtedly, been prevailing, to a limited extent, for the two or three months preceding, having been mistaken for remittent, typhus, and typhoid fevers. By resolution of the Board, this fever was declared to be of a contagious or infectious nature, within the meaning of the 5th section of the Sanitary Code, and was incorporated with the diseases mentioned in that section, and the same reports were required to be made in respect to said disease as were required relative to any disease mentioned in said section. The fever proved to be so contagious that the immediate removal of the sick to hospital, and thorough cleansing and disinfection of their apartments became indispensable, in the judgment of the Board, to control its spread. As this fever, from its contagious character, required separate and isolated hospitals, the Board requested the Commissioners of Charities and Correction to provide additional hospital accommodations, which request was promptly acceded to, and a "Relapsing Fever Hospital" was opened on Hart's Island. This hospital proved to be of great service, for the subjects of the disease were, in general, vagrants, who, when sick, are

proper subjects for hospital care. Their immediate removal to the hospital was, therefore, of twofold importance, as they were thus provided with necessary isolation and treatment. The City Sanitary Inspector was empowered to take summary measures to insure the necessary cleansing and disinfection of the apartments occupied by persons having this disease, whenever the owner did not clean and disinfect the premises, and he was authorized to expend a sum not to exceed $10 in any one house in cleaning, disinfecting, and whitewashing such house, and in each case he was directed to send a bill of the expenses for cleaning, disinfecting, and whitewashing, to the owner of the premises, and to use all reasonable effort to secure the payment of the same.

The direct mortality from this disease proved to be small compared with the number of persons attacked, the total number of deaths being 184 for the year 1870. The more important features which it presents to sanitary authorities are its contagious nature; the class of persons most susceptible, viz., the destitute and poorly-fed and housed; the effect which cleansing and disinfecting have in controlling its spread; its debilitating influence upon the sick, rendering convalescence tedious and liable to dangerous or fatal complications, and thus tending to increased pauperism. It proved to be, in a remarkable degree, under the control of preventive measures when thoroughly applied, the principle obstacle being the inability of the Board to exercise any supervision of the movements of the vagrant, homeless class, among which it prevailed. The history of this epidemic, and the lesson learneds from experience in its management and control, are given at length in a report of the Sanitary Committee. (See Appendix K.)

26. *Scarlatina.*—This most destructive disease of infancy was very prevalent and fatal during the past year. From every point of view this scourge of childhood must be regarded as demanding the most rigorous measures, both of prevention and treatment. It is peculiarly a disease of early life, the adult being but slightly susceptible to it, and hence every precaution should be taken to prevent an attack in childhood, and thus secure the immunity of age. The contagious principle, though very diffusible and of intense activity, can be effectually destroyed by agencies readily employed in every household, while many of its most fatal complications may be prevented by care and treatment.

With adequate power and means to fully apply the necessary measures of prevention, this disease may be brought under complete control, and it is to be hoped that the day is not distant, when every case of scarlatina may be as effectually isolated and subjected to as rigid care as are those of cholera, small-pox, or typus fever.

27. *Measles and Whooping-cough.*—These contagious diseases of childhood prevailed to an unusual extent in 1870. They have not been placed under the same restrictive measures as other contagious diseases, on account of their mild character, especially in early life. The popular belief also in the universal susceptibility of persons of all ages and conditions to one attack of measles, and of its greater fatality among adults than children, has made this domestic disease a not unwelcome visitant to the family, and rendered the enforcement of sanitary regulations more difficult than in other contagious diseases.

Whooping-cough is closely allied to measles as a mild contagious disease over which the sanitary authorities have not exercised any special control. And yet, as these diseases are chiefly fatal from complications, which are prevented by proper care and treatment, it becomes an important question if they should not receive more attention from Health Boards. Although it may not be advisable to attempt by stringent measures to prevent their diffusion, unless the epidemic is of an unusually severe form, yet the mortality might be greatly diminished by providing proper care and treatment of the destitute class among whom the death-rate is so excessive. Such provision, to be adequate, would require suitable hospitals or refuges to which the sick could be removed, where the appointments were such as to prevent the known dangerous complications to which the respective diseases are liable.

28. *Quarantine.*—The want of suitable warehouses where merchandise, arriving in the port of New York in vessels subject to quarantine, may be discharged and freed from infection has long been a serious burden upon commerce, by rendering it necessary that such merchandise be discharged upon lighters at a considerable distance from shore, thereby adding largely to the expenses of importation. Such merchandise is composed chiefly of goods which are subject to duty under the revenue laws of Congress, and must, of necessity, be

subject to the control of the revenue officers of the general government. On the 8th day of June the Board adopted a preamble and resolutions on this subject, expressing the opinion that it is the duty of Congress to provide immediately for the erection of one or more warehouses, at some point near the anchorage for vessels under quarantine, where merchandise arriving therein may be discharged and disinfected without delay, and without the additional expense now imposed upon the shipper by the discharge of goods upon lighters remote from the wharves of this city. The Board, by resolution, requested his Excellency the Governor of this State to transmit to the President of the United States a copy of the preamble and resolutions above referred to, and to respectfully request that the attention of Congress be called to the matter in such form as he might deem best adapted to secure favorable action thereon by that body.

It having been reported that many vessels from ports infected with yellow fever, carrying cargoes consigned to or owned at this port, for the purpose of evading the quarantine laws of the State of New York, were sent for their port of entry to small towns along the seaboard, and from thence brought or sent their cargoes in smaller vessels directly to the wharves of this city, without being subject to the examination of the Health Officer of the Port, the Board, on the 26th day of July, directed the City Sanitary Inspector to withhold permits from vessels coming from infected ports with cargoes consigned to this port, unless the captain, agent, or consignees should present the usual certificate *to proceed* from the Health Officer of the Port of New York.

Information having been received from official sources that yellow fever existed at New Orleans and Mobile, and that there was danger of the same being brought to the port of New York, and as the present quarantine regulations with regard to these ports would cease on the first day of November, except by special proclamation, this Board, in the discharge of its duty and by virtue of the power conferred by the Section 24, Section 25, and Section 26 of Chapter 147 of the Laws of 1856, and Section 12 and other sections of Chapter 74, and Section 3 of Chapter 686 of the Laws of 1866, and Section 26, Chapter 383, of the Laws of 1870, proclaimed and declared said ports to be, each and severally, an "infected place" within the meaning of the health laws of this State, and that the proclamation should

continue until the 30th day of November of the present year, and on that day, at noon, cease to have effect.

29. *Public Urinals and Drinking Hydrants.*—The public urinal in Astor Place having been remodelled and adapted to the wants of the people, and placed under the care of a keeper, has proved a great public convenience. The Department of Parks, during the present year, has erected urinals in the city parks; but it is believed that the health and comfort of the public demand that the number should be largely increased, that they should be located in all parts of the city, and be constructed for the accommodation of females and children as well as males.

The public drinking hydrants erected in this city by the sanitary authorities were, by resolution of the Board, adopted July 12, 1870, transferred to the Department of Public Works, that being the proper department, under the new city charter, for their care, and for the erection of such additional hydrants as the health and comfort of the public may from time to time demand.

30. *Rescue of Drowning Persons.*—On the 1st day of June, the Board directed the Sanitary Committee to examine and report on the condition of the "life-saving apparatus," whether it is used in rescuing drowning persons, and with what results. After a careful examination and inquiry at the several stations, it was ascertained that a large number of lives had been saved by the use of the apparatus during the present and past years. Policemen stationed at the ferries and waterside, ferry-masters, boatmen, and others, unite in the opinion that the life-saving apparatus is an indispensable necessity, and that its introduction and maintenance is creditable to the department to which the preservation of life and health is intrusted. The Board ordered the apparatus to be placed in complete repair, and to be redistributed according to the ascertained necessities of the several localities.

Operations of the several Bureaux.—The organization of the Health Department into several bureaux, as provided by the charter, each bureau having distinct and well-defined duties, with a competent executive officer at its head, has given great efficiency to the service. The division of labor among these bureaux is such as to render them en-

tirely distinct in all their operations; but when combined, they represent every branch of work undertaken by this department. The reports of the chief officers of the bureaux give at length, and in detail, the amount and kind of work performed by each, with such information and suggestions in regard to the subjects under consideration as these officers have deemed important. (See Appendix.) In this report the Board can present but an outline of the duties of the several bureaux, and a brief summary of their labors during the past year.

Bureau of Sanitary Inspection.—The work of this Bureau comprises the inspection of nuisances, the care of contagious diseases, the regulation of tenement houses, cleansing and disinfection, etc. Its chief officer, the City Sanitary Inspector, has under his direction a corps of Health Inspectors and Assistant Health Inspectors, who are selected for their special qualifications for the duties which they are required to perform. The Disinfecting Corps is also under his charge and direction.

The amount and kind of service performed by this Bureau during the past year is given in the following table:—

The following Summary of the Semi-weekly Reports of the Inspectors exhibits the Amount and kind of Labor performed by the Medical Officers of the Bureau during the year ending March 30, 1871:—

Matter and Place Inspected.	Total Inspections.	Causes of Complaint.	Matter and Place Inspected.	Total Inspections.	Causes of Complaint.
Public buildings	160	20	Manure dumps	14	5
Asylums	5	2	Vessels	88	7
Manufactories & workshops	463	125	Piers and docks	64	1
Tenement-houses	26,361	6,320	Piggeries	19	19
Private dwellings	3,924	518	Horse and cow stables	7,534	366
Other dwellings	3,206	126	Sunken and vacant lots	1,053	259
Stores and warehouses	1,059	112	Cellars and basements	1,958	849
Dangerous buildings	4	4	Waste pipes and drains	758	667
Rag and bone houses	32	32	Yards, courts, and areas	947	856
Dyeing establishments	3	3	Privies and water-closets	3,194	2,746
Slaughter-houses	267	67	Streets, gutters, and sidewalks	1,201	735
Markets and market places	149	16	Garbage boxes	45	45
Other buildings	798	148	Infected houses	2	2
Cattle-yards	3	....	Offal barge	1	1
Abbatoir	1	....	Fat depot	1	1
Hide establishments	2	2	Gasoline works	1	1
Wool-pulling establishments	2	1	Rendering docks	1	1
Oil-boiling establishments	2	....	Smoky chimneys	6	2
Moulding mill	1	1	Dangerous chimneys	26	26
Soap-boiling establishment	1	....	Cisterns and cesspools	4	4
Tripe and gut cleaning establishments	43	23	Marble yard	1	1
Lard-rendering and fat-melting establishments	503	146	Sausage factories	5	1
Head-cleaning establishm'ts	14	5	Street culverts and sewers	14	6
Lime-kilns	5	3	Violation of code	28	28
Breweries	29	1	Total inspections	54,033	....
Dumping grounds	31	16	Total cause of complaint	....	14,819

Whole number of reports received	15,101
" " positives	12,385
" " negatives	918
" " general	1,798
" " found correct	14,726
Whole number of reports returned for correction	305
Whole number of reports forwarded to Board	12,080
Whole number of reports negatives forwarded	918
Whole number of reports generals forwarded	1,798
Whole number of complaints from citizens	2,761

Complaint was made against 786 tenement-house owners to insert 3,019 ventilating windows.

685 tenement-house owners were made to comply with Section 2 of Tenement-house Act by inserting 2,402 windows.

Contagious Diseases visited and reported upon by Inspectors.		Vaccinations performed by Inspectors.		
Small-pox, Variola, and Varioloid...	1,433	Number of families visited		32,491
Varicella.....	44	Primary vaccinations in dwellings.....	3,650	
Relapsing Fever.....	1,110	Secondary vaccinations in dwellings.....	7,493	
Typhoid "	323			11,143
Typhus "	19	In schools:		
Yellow "	20	Primary.....	769	
Scarlatina.....	720	Secondary.....	16,543	
Measles.....	65			17,312
Cholera.....	5			
Cholera Morbus.....	1	Total vaccinations in schools and houses.....		28,455
Diphtheria.....	18			
Total number of visits by Inspectors of contagious diseases.....	3,753			

Sanitary Permit Bureau.—The duty of the Sanitary Permit Bureau is to issue the permits granted by this Board, other than permits for burial, permits to scavengers, and permits to vessels from Quarantine or for the landing of their cargoes. The Sanitary Permit Inspector is also required to make inspections and to report whether the business, matter, or thing for which every permit has been granted is conducted or is in a condition in conformity to the terms and provisions of said permit. The following table gives the number of permits granted and denied by the Board for the year ending April 10, 1871:—

	To keep cows, horses, &c.	To occupy cellars as human habitations.	To slaughter animals.	To kill and dress poultry.	To sell fish, oysters, and meat.	To render fresh lard.	To manufacture sausages, tripe, &c.	To collect bones, prepare beef heads, &c.	To cart swill.	To manufacture soap, oils, &c.	To blast rocks.	To maintain smoke-house, &c.	To maintain dumping ground.	To build privy vaults.	To refine gold and silver.
Granted.....	1129	264	34	5	3	88	9	14	28	6	5	1	3	5	1
Denied.....	387	60	10	..	..	63	21	16	..	4	..	1	1	..	..

Bureau of Street-cleaning.—The duty of the Bureau of Street-cleaning is to inspect the public streets and report upon their sanitary condition so far as regards cleanliness. The chief officer of this bureau is also required to report any neglect or omission on the part of the contractor for street-cleaning in the performance of his duties. During the year 1870, it was also made the duty of the Inspector of Street-cleaning to

report the names of streets needing additional cleaning, and to report as to the proper performance by the contractor of his duties under the special contract made for such additional street-cleaning. The details of the work of this bureau are given in the report of the Inspector of Street-cleaning. (Appendix C.)

The importance of this thorough cleaning of the streets, as a sanitary measure, can scarcely be over-estimated. Filthy streets during the summer are a most fruitful source of diarrhœal diseases in all parts of the city, but in the tenement-house districts they are a known cause of the high death-rate from these affections. The past season was peculiarly adapted, by the long-continued dry weather, to intensify the poisons which street filth generate; but the constant cleansing and disinfection of the more densely-populated streets rendered, there is reason to believe, the sickness and mortality rates from diseases due to local uncleanliness much less than they otherwise would have been. The following table exhibits the amount of extra street-cleaning performed weekly:

Number of Miles of Streets in each Ward cleaned weekly under Contract of the Board of Health over and above the weekly cleaning under the Contract of the City.

WARD.	Once.	Twice.	Thrice.	Four times.	Five times.	Total.
First	8 72	3 172				12 244
Second	2 122	1 22				3 144
Third	1 12	2 132	4 170			8 74
Fourth	1 48	1 14	4 4	1 42	2 88	6 26
Fifth	2 21	3 72		6 42		11 144
Sixth	1 102	40	22			2 74
Seventh	8 120	22				9 142
Eighth	1 82	3 144	7 72	3 126		16 4
Ninth	10 24	3 16	2 88			15 108
Tenth	1 84	9 148	1 2		1 20	12 84
Eleventh		1 70	1 24	23 28		25 120
Thirteenth	1 84	11 172	3 168			16 120
Fourteenth	1 140	2 28	1 88		40	4 184
Fifteenth	3 72	2 92	3 148		28	10 30
Sixteenth	6 88	6 14				12 102
Seventeenth	2 98	26	12 111	2 100		19 132
Eighteenth	1 28	2 18				3 116
Nineteenth	4 132	5 18				9 142
Twentieth	4 132	12 18	2 128			19 132
Twenty-first	2 142	1 80	1 188			6 70
Twenty-second	6 82	1 8				6 184
	73 68	70 92	43 2	86 162	8 128	233 68/190
Avenues and streets dividing wards, and not included in above	....	....	....	....	....	28 90/190
Grand total						261 158/190

☞ The fraction is of 190. ☜

Bureau of Records of Vital Statistics.—The duties of the Bureau of Records of Vital Statistics consist in the proper registration of births, marriages, and deaths occurring in this city. The care of the records of former years also devolves upon the Register of Records, and he is the officer designated by the Board to issue permits for the removal and for the burial of the dead. It appears from the Report of the Register of Records, that the total mortality of New York for the year 1870 was 27,175. The population of the city, according to the last Federal census, was 943,842; this would give a mortality of 28.79 deaths to each 1,000 of the population. The most important and prominent features of the mortality records, the course of epidemic diseases, with the meteorological conditions during the year, are fully exhibited by the Register (Appendix D). The following is a brief summary of the mortality for the different quarters of the year:—

During the first quarter (January, February, and March) the mean temperature was 34.42° F., being two degrees higher than the average of the preceding ten years. The greatest range of temperature was 45° F. There were 6,517 deaths against 5,919 deaths for the corresponding quarter of 1869, being an increase of 402. This increase was chiefly in the zymotic class, and was largely due to small-pox, which was prevailing extensively at the opening of the year, and scarlatina, which proved unusually fatal during this quarter. Relapsing fever for the first time appeared in our mortality records, having caused 45 deaths.

During the second quarter (April, May, and June) the mean temperature was 62.97°, or nearly four degrees higher than the average temperature of the preceding ten years. The greatest range of temperature was about 63°. The total mortality for the quarter was 6,293, being an increase of 228 over the spring quarter of 1869, and of 965 over the average number deaths for the corresponding quarter of the preceding ten years. This excess of deaths appears to have been caused by diarrhœal diseases and relapsing fever. The intense heat of June was peculiarly unfavorable to infantile life, and the number of deaths of children under one year of age largely increased, week by week, until, for the week ending July 2d, it reached 228. Relapsing fever was at this time widely prevalent, and caused 106 deaths for the quarter.

During the third quarter (July, August, and September) the mean temperature was 74.69°, being nearly three degrees higher than for the

average of ten years preceding, the greatest range being 67°. The total mortality was 8,416 deaths, being an increase of 1,026 over the corresponding quarter of 1869. This increase was due to diarrhœal affections, which caused 33 per cent. of the total mortality, being 4 per cent. greater than for the summer quarter of 1869. Relapsing fever caused 25 deaths, and remittent and intermittent fevers were very prevalent and fatal. The number of deaths by sunstroke during June, July, and August was unusually large, being 238.

During the fourth quarter (October, November, and December) the mean temperature was 46.93°, being about three degrees higher than for the corresponding period of the last ten years; the range was 66°. The total number of deaths was 5,949, being 156 in excess of the corresponding quarter of 1869. The diseases which gave an increased mortality were diarrhœal affections, croup, measles, scarlatina, and phthisis.

The total number of marriages registered in 1870 was 7,965, being a decrease of 710 as compared with 1869; and the total number of births registered in the same period was 14,524, being an increase of 577 over the total of 1869.

The registration of marriages and births has hitherto been a neglected branch of the service of this bureau. Though the statute has required these returns to be given since 1847, yet no effort to enforce it had been made until the latter part of the past year. The duty of making such returns had come to be regarded as voluntary, and the result is that these records are extremely imperfect, and for all practical purposes wellnigh useless. In order to secure compliance with the law, the Board commenced the prosecution of delinquents. The result has been a most satisfactory increase in the returns of both marriages and births, and a much nearer approximation to the actual number of each than has ever before been secured. Great care has been taken in these prosecutions to impose no penalty where there was reason to believe that the party had not been culpably negligent.

ORDERS OF THE BOARD.

During the year ending April 10, 1871, the number of orders issued by this Board for the abatement of nuisances was eleven thousand six hundred and eighty (11,680). Of this number, two thousand nine hundred and seventy-four orders were issued under the first subdivision

of Section 14 of Chapter 74, Laws of 1866, by the terms of which the party served is allowed three days in which to demand a hearing by the Board of the testimony which may be presented, to show that the order should be modified or revoked. In cases where no hearing has been asked for, and the order has not been complied with, final orders, in the original or an amended form, to the number of seven hundred and seventy-eight (778), have been issued, and the Board has directed the attorney to commence suits for penalties for non-compliance with such orders. All other written orders, in number seven thousand nine hundred and thirty (7,930), have been issued under the second subdivision of Section 14 of Chapter 74, Laws of 1866, and are of a peremptory character, requiring that the nuisance be abated within five days, and, if not complied with, the City Sanitary Inspector has been directed to enforce the same without further notice, or the attorney has been directed to commence actions for penalties for non-compliance. The following is a statement of the subjects of the orders above referred to :—

Alleys cleaned	95	Cellars filled	14
" disinfected	8	" flagged	1
" paved	4	" graded	41
" repaired	11	" steps repaired	8
Animals (dead) removed (No. of orders)	12	" vacated	100
Areas cleaned	139	Cellar doors repaired	4
" constructed	2	" grating "	17
" covered	2	Cesspools cleaned	29
" filled	2	" connected with sewer	22
Ashes, filth, garbage, etc., removed (No. of orders)	1,813	" covers made for	3
Balusters repaired	67	" disinfected	21
Basements cleaned	24	" emptied	19
" disinfected	5	" filled	14
Boiling heads, pigs' feet, etc. (business of) discontinued	8	" made	42
Bridges (gutter) repaired	10	" repaired	9
Cars, railroad, disinfected and cleaned (No. of orders)	1	Chimneys cleaned	1
Ceilings cleaned and whitewashed	115	" constructed	1
" repaired	21	" extended	25
Cellars cemented	19	" repaired	109
" cleaned	723	Cisterns constructed	3
" connected with sewer	4	" disinfected	9
" coping repaired	2	" emptied and cleaned	16
" covered	13	" filled	10
" disinfected	202	" repaired	2
" drained	18	Copper boilers manufacturing (business of) discontinued	1
		Cows removed (No. of orders)	49
		Croton pipes repaired	172
		Drains cleaned	3

Drains connected with sewer	4
" covered	14
" extended	4
" filled	5
" made	20
" (obstructions in) removed	102
Excavations filled	17
Faucets repaired	15
Flagging in yard repaired	43
Floors (house) cleaned	12
" " repaired and relaid	1
" (privy) repaired	15
" (stable) repaired	1
Fertilizing powders manufacturing (business of) discontinued	2
Fowls removed (No. of orders)	43
Garbage boxes lined with metal	30
" " constructed	88
" " disinfected, emptied, and cleaned	41
" " removed	12
Gas-pipes repaired	1
Gold and silver refining (business of) discontinued	1
Gut-cleaning and slush-rending (business of) discontinued	10
Gutter (house) constructed	14
" " extended	1
" " repaired	54
" (street) (obstructions in) removed	103
" " cleaned	196
Gutter-stones reset	940
Halls cleaned	178
" whitewashed	165
Hides (business of curing) discontinued	1
Horses removed, live (No. of orders)	10
Hydrants removed	10
" repaired	102
Leaders connected with sewer	14
" constructed	14
" extended	70
" repaired	276
Leather tanning (business of) discontinued	7
Liquid gas manufacturing (business of) discontinued	2
Lots cleaned	76
" connected with sewer	4
" disinfected	2
" drained	5
" fenced	13
" filled	106
" graded	39
Manure removed (No. of orders)	527
" vaults cleaned	18
Manure vaults connected with sewer	1
" " constructed	496
" " covered	51
" " disinfected	12
" " repaired	15
Match manufacturing (business of) discontinued	1
Obstructions in street removed (No. of orders)	4
Pavements repaired	10
Pigs removed (No. of orders)	4
Pipes, soil (obstructions in) removed	128
" (steam) extended	1
" waste, cleaned	4
" " connected with sewer	13
" " extended	9
" " (obstructions in) removed	80
" " repaired	161
" " trapped	34
Plaster (loose) removed	17
" manufacturing (business of) discontinued	1
Premises cleaned	91
" closed	2
" connected with sewer	275
" disinfected and fumigated	20
Premises repaired	18
Privies disinfected, emptied, and cleaned	2,728
Privy-houses cleaned	199
" constructed	22
" disinfected	75
" removed	2
" repaired	160
Privy-vaults connected with sewer	71
" filled	136
" flushed	6
" made	77
" repaired	332
Rags (business of storing) discontinued	3
Railings made	22
" repaired	10
Roofs cleaned	13
" repaired	275
Sewers repaired	124
Sewer-pipes constructed	2
" (obstructions in) removed and repaired	2,839
" trapped	17
Shutes (coal) covered	11
Sidewalk cleaned	40
" flagged	63
" reset	343
Sinks constructed	60
" connected with sewer	25
" removed	2

Sinks repaired	14	Valley-drains constructed	201
Skylights repaired	14	Vats connected with sewer	1
Slaughtering (business of) discontinued.	6	Vaults cleaned	2
Spaces (vacant) cleaned	51	" disinfected	1
" filled and graded	3	Ventilators constructed	14
Stables cleaned	71	Walls cleaned and whitewashed	131
" connected with sewer	15	" constructed	3
Stable-floors cemented	6	" repaired	39
" graded	17	Water-closets cleaned	73
Stagnant water removed (No. of orders).	58	" constructed	101
Stairways cleaned and disinfected	16	" disinfected	33
" repaired	54	" flushed	32
Stoops-repaired	58	" removed	1
Stove pipe extended	1	" repaired	35
Tanks cleaned (No. of orders)	2	Yards cleaned	1,116
Tunnel, R.R., disinfected	1	" disinfected	69
Urinals cleaned	8	" filled	2
" connected with sewer	4	" flagged	18
" constructed	3	" graded and repaired	237
" repaired	6	" paved	12

ACTIONS FOR PENALTIES.

Since the organization of the present department more than six thousand complaints, arising under the "Tenement-house Act," have been referred to the attorney, with instructions to commence actions for the penalties established by law, if the persons liable failed to comply with the requirements of that salutary act. After proper notification, such a preliminary notice has usually accomplished the end in view, and comparatively few actions have been brought. A very large class of nuisances have been effectually and speedily abated under the orders of the Board, without resort to legal measures. In those cases where it has seemed necessary to prosecute parties neglecting to comply with the orders or ordinances of the Board, such a proceeding has generally proved entirely effective. The Courts have shown a gratifying disposition to co-operate with the Board in all attempts to regulate or control evils within its jurisdiction By means of notices, and, in some cases, by the commencement of actions against delinquents, the value and efficiency of the Bureau of Records of Vital Statistics have been greatly increased. Clergymen, magistrates, physicians, and others from whom statistical information is derived, are, as a rule, observing the laws of the State which enjoin early and full reports of marriages, births, deaths, and the presence of contagious or infectious disease. With a view to promoting the convenience of parties prosecuted by the department, and to insure the systematic and expeditious prosecution

of the business devolving upon the attorney, the records, and all papers relating to suits and judgments, have been transferred to the building occupied by the Board, and are so arranged as to admit of easy reference. The change in this respect from the former practice has proved most satisfactory.

Number of actions commenced		2,576
Classified as follows:—		
For non-compliance with the orders of the Board	1,562	
" violations of the "Tenement-house Act"	713	
" " " " Sanitary Code	301	
		2.576

CHANGES IN THE BOARD.

In October, 1870, Police Commissioner Matthew T. Brennan resigned his office, thereby vacating his seat in this Board. The Board adopted resolutions acknowledging the value of his services, and testifying to his ability and fidelity in the discharge of his duties as a member of the the Board. Thomas J. Barr, Esq., having been appointed Police Commissioner in place of Brennan, resigned, took his seat as a member ot this Board on the 7th day of December, 1870.

EXPENDITURES.

The expenses of the Board for the year ending April 10, 1871, as appears from the Report of the Committee on Finance (which will be found in Appendix H), were $169,478.27. The amount collected and turned over to the Board by the attorney and counsel, for penalties, &c., in suits by the Board for violations of the Sanitary Code and Tenement-house Act, and for non-compliance with the orders of the Board, was $6,064.41. The amount received for discharge of liens filed by the late Metropolitan Board of Health, was $76.78. In all expenditures by the several departments the most rigid economy has been observed by the Board.

Respectfully submitted,

J. S. BOSWORTH,
President.

EMMONS CLARK,
Secretary.

APPENDIX.

"A."

REPORT OF THE SANITARY SUPERINTENDENT.

BUREAU OF SANITARY INSPECTION,
HEALTH DEPARTMENT, No. 301 Mott street,
NEW YORK, April 1, 1871.

EMMONS CLARK, *Secretary to the Board of Health:*

SIR—I have the honor to present the following report of the duties performed by the various officers and employés connected with this Bureau for the year ending April 1, 1871.

This Bureau is one of the four provided by the Charter of this City, in the organization of the Health Department.

Its special duties are: the care of contagious diseases; the discovery and examination of all causes affecting the public health; removal of nuisances, and executing the orders of the Board of Health generally.

In the performance of these duties, this Bureau furnishes such information, prepared upon legal forms in each case, as is required by the laws which the Board of Health is authorized to execute.

These are the Health Laws of 1866, the Tenement-house Act, and the Sanitary Code, which, after having been conformed by the Board under the terms of the Charter of 1870, became City Ordinances.

Skilled officers are provided by the Board in the appointment of educated physicians, with special reference to the investigation of all causes of unhealthfulness, and for the diagnosis and care of contagious diseases, whenever the public health may be endangered thereby; also experts in chemistry, sanitary engineering, and plumbing, whose duties are co-ordinate and intimately associated upon questions bearing directly or indirectly upon health.

Hence an intelligent, efficient, and experienced sanitary corps is constantly engaged in the investigation and determination of such

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questions, and in presenting evidence in such form as may enable the Board to arrive at just conclusions, and order such measures as, in its judgment, may promote and protect the public health.

The officers appointed by the Board, and attached to this Bureau, during the past year, are as follows:

CITY SANITARY INSPECTOR AND SANITARY SUPERINTENDENT.

Moreau Morris, M.D., elected April 20, 1870.

HEALTH INSPECTORS.

Willard F. Deming, M.D., appointed (*vice* H. O. Ely, resigned) June 28, 1870.
Lucien Damainville, M.D., appointed May 30, 1870.
Edward H. Janes, " " "
Henry D. Joy, " " "
Philip O'Hanlon, " " "
Stuyvesant F. Morris, M.D., promoted (*vice* Dwyer, resigned) July 1, 1870.
William H. B. Post, M.D., appointed May 30, 1870.
Charles F. Roberts, " " "
Henry R. Stiles, " " "
Augustus F. Viele, M.D., promoted (*vice* Passmore, resigned) Nov. 30, 1870.

ASSISTANT HEALTH INSPECTORS.

Edward Frankel, M.D., appointed July 1, 1870.
Franz Heuel, " " "
Bernard Hughes, " " May 30, 1870.
A. B. Judson, " " July 1, 1870.
Simeon N. Leo, " " "
J. F. O'Conor, " " May 30, 1870.
C. M. O'Leary, " " July 1, 1870.
Roger S. Tracy, " " Nov. 30, 1870.
James Ingram, appointed May 30, 1870.
James McCarty, " June 28, 1870.

The duties imposed upon these officers, requiring a constant and unceasing supervision over their respective districts, are onerous, oftentimes unpleasant, and not unfrequently of a dangerous character.

Brought in immediate contact with all classes and nationalities, the refined and cultivated, as well as the wretched and abandoned, and with those suffering from all forms of disease, no little tact and judgment are requisite to perform and execute these duties with such deli-

cacy and firmness as shall avoid giving offence, and yet secure the desired end which public necessity demands.

In marked contrast with the experience of former years, the Health Inspectors are now received in a friendly spirit while making house-to-house visitations among tenement houses. These inspections comprise by far the largest class of their duties, and tenants have learned, by experience, that the result of these visits is an improvement in their sanitary condition.

The enforcement of the provisions of the Tenement-house Act, by the action of the Board upon information furnished through its officers, has been so effectual that it is now the exception, rather than the rule, to find a tenement house which does not comply, in its most essential requirements, with the provisions of the law.

The result is, that those fevers which usually prevailed, at all seasons, in this class of domiciles, are now found to occur but rarely. The statistics of relapsing, typhoid, and typhus fevers, for the past year, furnish abundant evidence of the improved sanitary condition of this class of dwellings.

The duties of the Health Inspectors have been considerably increased, during the year, by the unusual prevalence of contagious diseases, such as small-pox, scarlatina and measles.

At the time of the organization of this department, relapsing fever and small-pox were the principal diseases of a contagious character with which it had to grapple.

Owing to the efficient measures adopted by the Board, in causing the removal of small-pox and relapsing fever to hospital, the thorough fumigation, cleansing, disinfection, and the evacuation for a time of infected premises, relapsing fever soon ceased as an epidemic, while small-pox contagion was arrested, the number of cases being reduced to the minimum. During the winter months, notwithstanding repeated warnings issued to the public, at almost every public meeting of the Board, to protect themselves by vaccination from a threatened epidemic of small-pox, it began to increase. Long immunity from this disease, as an epidemic, seemed to have caused an indifference to its danger in the public mind, and, consequently, a neglect to secure themselves by revaccination from its ravages. From the 19th December, 1870, it gradually but steadily increased in numbers, until it assumed such pro-

portions as to create some public alarm. But, by steady and increased efforts towards its arrest, and by arousing the public interest, and offering vaccination freely to the great mass of the population, by house-to-house visitation, the medical officers of the Board have succeeded in protecting many thousands who were undoubtedly susceptible to its dangers, and have, thus far, prevented this loathsome disease from assuming the proportions of former years.

Scarlatina has been an epidemic of much larger proportion in comparison than small-pox, and, although the number of deaths from it have greatly exceeded those by small-pox, yet its ravages have been almost unheeded by the public or the medical profession generally. Measles, another of this class of diseases, has also run a formidable course; and, although not so fatal as scarlatina, the complications and sequelæ of both these diseases have tended to swell the mortuary records far in excess of all other contagious diseases.

The time has arrived when these diseases, bearing certain elements of an infectious character, should be better controlled by sanitarians. Isolation, disinfection, and cleanliness, are the chief means by which these diseases may be thus controlled.

During a course of specific investigation, instituted in this Bureau within the past few months, the evidence of personal infection was, in a very large number of cases, distinctly traced. In the beginning of any one of this class of diseases, while its source of infection is limited, it seems to be possible, by efficient measures, to prevent its increase or spread into an epidemic.

When great numbers become affected, the elimination of the poisonous element, which is certainly something portable, assumes such magnitude or quantity, and its diffusibility is so great, that, like the "yeast which leavens the whole lump," all who are susceptible become contaminated therewith.

If proper sanitary measures were well understood by the medical profession and the people generally, and efficiently applied, the epidemic form, at least, might be prevented.

Hospitals devoted exclusively to this class of diseases, if properly managed under sanitary supervision, with especial reference to controlling the spread of either contagion, would in a great measure unquestionably secure this end.

The following tabulated statement of contagious diseases, as reported to this Bureau, under the provisions of the law, will afford a large amount of information in the study of diseases of this class. It has been carefully collated from the records kept in this Bureau, from the actual reports forwarded by the medical profession, and, although not exact as to the whole number of cases that have occurred in the city, it is to be hoped that its exhibition in this form, by the annual report of the Health Department, will induce a more uniform compliance with the law, as well as interest those who may have been heretofore unwilling or indifferent in furnishing material for this scientific study.*

Such a record probably never has been made of the number, names, and localities of contagious diseases occurring in any great city.

Its value for statistical information, in the comparison of percentages of deaths to any one class of diseases, in proportion to the number of cases occurring within certain limits of territory, cannot fail to be recognized.

A marked instance of the value of forwarding to the Health Department information of contagious diseases promptly, and thus affording it the knowledge of its presence, is shown by the fact, that although yellow fever existed within our harbor for about three months during the past summer, yet but eleven cases of this disease occurred within the city proper. The sanitary measures adopted in each case seem to have prevented its spread to any other person than those originally affected by visiting the locality where it had found a lodgment.

STATISTICS OF CASES OF CONTAGIOUS DISEASES AS REPORTED TO THE BUREAU OF SANITARY INSPECTION, FOR THE YEAR ENDING APRIL 1, 1871.

Small-pox.

Total number reported	1,093
Total number of houses in which cases of small-pox occurred	869
Number of houses in which two cases occurred	75
" " three cases occurred	23

* The medical profession, unfortunately, have not responded to the efforts of the officers of the Board in securing more nearly the actual number of cases of contagious diseases that have occurred in the city during the past year; but it is to be hoped that these efforts may hereafter meet with a more cordial response, in order that these statistics may be made more accurate, and therefore more valuable to science.

Number of houses in which		four cases occurred	17
"	"	five cases occurred	5
"	"	six cases occurred	2
"	"	seven cases occurred	1
"	"	nine cases occurred	2
"	"	eleven cases occurred	1

STREETS CONTAINING THE LARGEST NUMBER OF CASES.

West Thirty-fifth street	9	cases	Tenth avenue	18	cases
West Forty-first street	10	"	Avenue A	18	"
Second street	10	"	Fifth street	19	"
Norfolk street	11	"	Delancey street	20	"
Ninth avenue	13	"	Second avenue	33	"
East Forty-eighth street	15	"	First avenue	46	"
East Thirty-fourth street	18	"	Third avenue	51	"
East Forty-sixth street	18	"			

HOUSES CONTAINING THE LARGEST NUMBER OF CASES.

No. 128 East Fourth street	3	cases	No. 493 Tenth avenue	4	cases
" 270 Delancey street	3	"	" 403 West Thirteenth street	4	"
" 47 Delancey street	3	"	" 408 West Sixteenth street	4	"
" 98 Essex street	3	"	" 400 West Twentieth street	4	"
" 204 East Forty-second street	3	"	" 555 West Forty-second street	4	"
" 333 East Forty-seventh street	3	"	Sixty-first street and Second avenue	4	"
" 333 East One Hundred and Seventeenth street	3	"	No. 55 First avenue	4	"
" 57 First avenue	3	"	" 41 Lewis street	4	"
" 1074 First avenue	3	"	" 347 Rivington street	4	"
" 126 Forsyth street	3	"	" 61 Sullivan street	4	"
" 130 Greenwich street	3	"	" 690 Second avenue	4	"
" 127 Norfolk street	3	"	" 201 Avenue A	5	"
" 65 Norfolk street	3	"	" 243 East Forty-fifth street	5	"
" 129 Ridge street	3	"	" 243 East Forty-sixth street	5	"
Sixty-seventh street, between Eighth and Ninth avenues	3	"	" 915 Third avenue	5	"
			Boat foot of Delancey street	6	"
No. 135 Delancey street	4	"	No. 133 Tenth avenue	6	"
" 439 East Seventeenth street	4	"	" 103 Hester street	7	"
" 233 East Forty-sixth street	4	"	" 504 East Sixteenth street	9	"
" 339 East Forty-seventh street	4	"	" 434 Fifth street	9	"
" 332 East Forty-eighth street	4	"	" 323 East Thirty-first street	11	"

Relapsing Fever.

Total number of cases of Relapsing Fever during the year ending March 31, 1871	1,454
Total number of houses in which cases of Relapsing Fever occurred	723
Cases reported from Bellevue Hospital and included in above total	17
Cases reported from Castle Garden	3
" " " Hart's Island	4
Vagrants (cases reported as)	131
No name " "	26
Out of town " "	68
Number of houses in which two cases occurred	84
" " " three " "	46
" " " four " "	16
" " " five " "	20
" " " six " "	9
" " " seven " "	4
" " " eight " "	3
" " " nine " "	1
" " " ten " "	3
" " " eleven " "	1
" " " thirteen " "	1
" " " fifteen " "	1
" " " twenty-three cases "	1

NAMES OF STREETS CONTAINING LARGEST NUMBER OF CASES.

Mott street	106 cases	Greenwich street	27 cases
Cherry street	98 "	Oak street	22 "
Mulberry street	82 "	Pearl street	22 "
Baxter street	64 "	West Fortieth street	21 "
Washington street	42 "	Spring street	16 "

HOUSES CONTAINING THE LARGEST NUMBER OF CASES.

No. 6 Staple street	5 cases	No. 46 Thames street	7 cases
" 15 Dry Dock street	6 "	" 49 Baxter street	8 "
" 384 Grand street	6 "	" 229 Mott street	8 "
" 35 Hamilton street	6 "	" 38 Mulberry street	8 "
" 251 Mott street	6 "	" 221 Cherry street	9 "
" 41 Spring street	6 "	" 5 Batavia street	10 "
" 60 West Broadway	6 "	" 549 East Twelfth street	10 "
" 549 West Twenty-sixth street	6 "	" 555 West Twenty-sixth street	10 "
" 450 West Thirty-second street	6 "	" 55½ Baxter street	11 "
Hopper Home	6 "	" 435 West Seventeenth street	13 "
No. 133 Goerck street	7 "	" 519 West Fortieth street	15 "
" 500 Greenwich street	7 "	" 281 Mott street	23 "
" 279 Mott street	7 "		

Typhus Fever.

Total number of cases of typhus fever during year ending March 31, 1871	73
Total number of houses in which cases of typhus fever occurred	67

Typhoid Fever.

Total number of cases of typhoid fever during year ending March 31, 1871	615
Total number of houses in which cases of typhoid fever occurred	476
Cases reported from Ward's Island, and included in above total	23
Cases reported from Deaf and Dumb Institutions, and included in total	53
Number of houses in which two cases occurred	33
" " " three " "	8
" " " four " "	2
" " " five " "	2
" " " seven " "	1

Scarlatina.

Total number of cases of scarlatina during year ending March 31, 1871	1,918

Measles.

Total number of cases of measles during year ending March 31, 1871	1,565

Diphtheria.

Total number of cases of diphtheria during year ending March 31, 1871	302

TENEMENT HOUSES.

Ventilation.—The past efforts of the Health Department, in securing a proper supply of air and light in tenement houses, have at length resulted in a general compliance with the 2d section of the Tenement-house Act, which is very apparent to the Inspectors, and which has insured a permanent benefit to this class of people.

It is true that many of those who should be benefited by this provision will neither appreciate or make use of it; but, then, the windows and ventilators are provided; and gradually their own experience, together with the admonitions of the Inspector, will operate upon their prejudices until they no longer fear fresh air.

Even now, if the question of the abolition of ventilating windows and shafts was put to vote in any of our large tenement homes, the verdict would probably be overwhelming in favor of their retention.

There are many instances, however, where the provision of windows amounts to nothing more than a *technical* compliance with the law, owing to the fact of their opening against a rear or adjoining wall, or inside sleeping-rooms where a proper cross-current of air cannot be obtained. These cases will constantly occur, owing to the disposition of

owners to economize every inch of room in building, and seem to call imperatively for the compulsory construction in every new tenement house (as Health Inspector S. F. Morris expresses in his report) of "a ventilating shaft of good size, capped with a ventilated skylight, the base constructed of lattice-work, and with free communication with every inside sleeping-room."

In view of the inclination of many tenants to keep the ventilating windows of their rooms closed on the plea of "too much air," or "too little privacy," it has been suggested by Inspector Frankel that, "instead of glazed sashes, wired frames be used, with meshes sufficiently small to prevent strong gusts of air from the halls, and to secure ventilation." *Some* access of fresh air would thus be insured, while a slight curtain would sufficiently secure the needed privacy of the apartment.

Defects of ventilation and insufficiency of light are not, however, confined to tenement houses. Many private houses, and a large proportion of the business buildings which crowd our lower wards, are so poorly provided in these respects as seriously to impair the health of those who are compelled to pass a large portion of their waking hours in them; and there is much of justice in the remarks contained in the report of Inspector Stiles in regard to "*architectural causes of disease*," and in the suggestion of Inspector Viele that all plans, for public buildings at least, should be submitted to the Board of Health for examination prior to their erection, with the view of securing in the original construction a proper amount of ventilation.

General Condition.—The testimony of inspectors is uniform in regard to a marked and gratifying improvement in the matter of cleanliness of tenement houses, and an increased disposition of both owners and tenants to keep hall-ways, yards, alley-ways, and areas in good and wholesome condition.

As remarked by Inspector Janes and other inspectors, "owners and agents have learned from experience that a prompt compliance with the orders of the Board, or even with the verbal suggestions of the Inspectors, is far more profitable than any attempt at evasion or resistance through the medium of the courts, and that such attention to the sanitary condition of their property begets in their tenants a corresponding degree of attention and care in the use of the premises; and is,

moreover, a matter of pecuniary interest, as tending directly to secure good tenants and prompt payments."

Tenants, on the other hand, seem to have attained a better appreciation than formerly of the influence of the Health Board upon their own interests and welfare; its officers are regarded as friends, their visits welcomed, their advice more generally followed, their questions more promptly and honestly answered, and information frequently voluntarily tendered concerning obscure nuisances which could not otherwise be properly reached.

Popular Sanitary Education.—It is, indeed, evident to those who from long experience are best able to judge, that the labors of the health inspectors during the past six years are beginning to bear their legitimate fruit in the *gradual education of the people* to an appreciation of the importance of ventilation, cleanliness, and light. "Thoughtless minds cannot but receive new and lasting impressions on these subjects when they see the hand of authority vacating unwholesome cellars, sweeping away rubbish and filth, and throwing open new windows to the air and sunlight."

General Character of Tenements.—The general sanitary condition of these tenements seems to depend upon and vary with:

(1.) *The structural character and condition of the building itself*—the old private dwelling, readapted to tenement purposes, being kept in proper order with much more difficulty than the modern tenement house, erected according to the regulations of the Board.

(2.) *The nationality and occupation of the residents.* The German population, as a rule, pay far more attention to and more promptly comply with sanitary regulations than the Irish; and the pursuit of trades or vocations at home, as is largely prevalent in several portions of the city, being by no means conducive to health.

(3.) *The character of the owner or agent*, and

(4.) *The employment of a housekeeper.*

Local Housekeepers.—The last-mentioned matter—the necessity of a local superintendence of all tenement houses—has attracted the especial attention of the Inspectors, and in compliance with their suggestions an amendment to the Tenement-house Act has been prepared, which it is hoped will meet with the necessary legislative sanction. The importance of such a provision, by which some one on the

premises shall be made responsible for the maintenance of its cleanliness and good sanitary condition, is demonstrated by daily experience, and owners of such property will ultimately recognize it as a pecuniary as well as a sanitary gain.

Construction of Buildings.—In regard to the construction of tenements, there is need of constant vigilance on the part of the Board and its officers to prevent the erection of buildings which technically comply with the letter of the law, but are really evasions of its spirit. A signal instance of this is noticed by Dr. Judson in the four-story building at rear of No. 20 Baxter street, each floor of which accommodates (?) four families. Yet this building—artfully contrived to meet the requirements of the Tenement-house Act—affords to the four or six persons who will probably occupy each tenement (consisting of a bedroom and a living-room), night and day, only 1,288 *cubic feet of air!* Can it reasonably be expected that health, comfort, or cleanliness can be secured for those who are crowded into such an air space? This case of overcrowding, notably, among others, has led to the preparation of an amendment to the Tenement-house Law, which will, it is hoped, not only prevent the erection of such buildings in future, but will enable the Board to moderate, in some degree, the overcrowding now so common in the tenement houses already built.

An important point in the construction of tenements is to secure to each family the greatest degree of *isolation* which it is possible to obtain. The right of privacy is fully as important to the self-respect and consequent comfort of the family as it is to the individual, and, as a most important force in our sanitary work, we must guard against its infringement. And it seems not unreasonable to hope that architects may yet devise some plan by which houses, occupied by the many, can be divided into parts accessible only to the tenant occupying them, so that each family would feel that they alone occupied and were responsible for their portion of the dwelling.

The perfection of comfort and accommodation which it is possible to attain in the construction of tenant houses is foreshadowed, at least, in the buildings in Inspector Viele's district, on First avenue, between Fifty-third and Fifty-fourth streets, and those at corner of Seventieth street and Third avenue, and in Fifty-third and Fifty-fourth streets, between Second and Third avenues, and in Inspector Morris'

district, at Nos. 81, 83, 85 Carmine street, and Washington, near Christopher street. These, with their admirably arranged ventilation for apartments and water-closets, sewerage, etc., etc., were built after plans approved and amended by the officers of this Board, and may justly be characterized as the *model tenement houses of the city.*

Posting of Names.—It is a matter of general complaint on the part of the Inspectors that this section of the law, providing for the posting of names of owners and agents in tenement houses, is not sufficiently complied with, thus entailing upon our officers a serious loss of time in looking up the needed information, which could be much better employed in the interests of the Board.

CELLAR AND BASEMENT HABITATIONS.

Under orders of the Board, many cellars and basements have been vacated as human habitations, and are now occupied for storage or other purposes; the remainder having been so remodelled as to be tolerated as temporary dwellings. In spite of all that can be done, however, to render underground apartments fit for this purpose, it still remains apparent that their occupation can only be defended on the barest grounds of *necessity.* No amount of repair or alteration can make them fit for human dwellings, for, even when cemented and provided with the light and space prescribed by law, the natural moisture inseparable from the soil, together with the proximity of privy vaults, water-closets, sewer and water pipes, and outbuildings, give rise to noxious gases and dampness which cannot fail to depreciate health.

Total prohibition by law of *all* cellar and basement habitations, if enforced, would be an immense benefit to the poor, for they would thus be driven to other localities, where the highest rooms in tenement houses can be obtained for about the same prices as are now paid for these dismal "holes in the ground."

PRIVIES AND WATER-CLOSETS.

These prolific sources of annoyance and complaint still continue to form a considerable portion of the work imposed upon sanitary inspectors; the larger portion, of course, occurring in tenement houses and buildings occupied for business purposes by a large number of persons. With a view to avail myself of the combined experience of the inspecting staff upon this important subject, I requested them, in December

last, to make special reports as to the "advisability of connecting roof and house drainage with privy-vaults;" and also in regard to "the best form of privy or water-closet accommodation for tenement houses."

The information and experience thus collected may be summarized as follows:

(1.) The *water-closet* is the best plan for private houses, or for those tenement houses and business buildings over which a proper supervision is maintained by janitors and housekeepers, but is totally inadequate, by reason of the ignorance, carelessness, and maliciousness of the occupants, in tenement houses and buildings not so supervised.

(2.) The *privy-vault, with sewer connection*, constructed according to the plans and regulations of the Croton Water Department, is *theoretically* the best plan for tenement houses, but *practically* is found to be faulty (even when well kept), owing to the ignorance and carelessness of average carpenters, masons, and plumbers, in the construction of these vaults. It thus happens that the complaints against sewered privy-vaults are more frequent in proportion to their respective numbers than those against unsewered privy-vaults.

(3.) The *privy-vault without sewer connection* is, all things considered, the simplest and most easily managed for tenement-house use; but a return to its use now would perhaps be inadmissible, on account of the frequent necessity of emptying, carting of the contents through the streets, etc., etc., entailing evils and inconveniences which, under the best regulations, cannot fail to excite disgust and complaint.

(4.) The objections above presented have induced the Inspectors almost unanimously to advocate the introduction of the "*school sink*" into tenement houses. This sink, which consists of a long shallow iron basin, having an outlet at one end, secured by a plug, and a hydrant or draw-cock for the supply of fresh water at the other, has been generally adopted by the public and many other schools of this city, and has been found to work admirably. It is easily managed, and not liable to get out of order. A similar arrangement is that of the *trough privy*, constructed of brick and cement, with the necessary inclination towards one end, at the outlet of which a substantial iron grating is placed, to prevent any obstructions from passing into the sewer, and with the proper flushing apparatus at the other end. This is in use in the tenement houses at the north-east corner of Third avenue

and Seventieth street, and commends itself to all who witness its operation.

To the complete and proper success of either the school sink, or the trough privy—as, indeed, of *all* kinds of privies and water-closets—constant supervision is necessary.

Many of the Inspectors strongly recommend the introduction of *ventilating shafts* into water-closets and privies of all kinds—shafts which shall carry off the noxious gases from the water-closets on each floor in tenement and dwelling houses, and from privies and water-closets located in small yards and between adjacent buildings—to a point *above the roofs of such buildings.*

They also concur in recommending a total severance of the roof and house drainage connections from the privy-vault, and the establishment in all cases of a direct sewer connection for all such houses and waste water, and in recommending the more regular use of disinfectants in *all* houses, whether tenement, public, or private.

It seems desirable that a sub-bureau should be organized, to which might properly be committed the supervision and practical direction of all sorts of structural details involved in the proper construction of privy-vaults, water-closets, as well as in questions constantly arising as to the best methods of sewerage and drainage of houses—questions which demand for their satisfactory solution a combination of practical knowledge and sanitary education which such a bureau alone could supply.

SEWERAGE.

Much has been done during the past year by the Department of Public Works in the important work of sewerage, but an immense amount still remains to be done, and the highest interests of the community demand that it shall be accomplished in as rapid, systematic, and perfect a manner as possible.

The present sewerage of the whole east side of the city, from Fourteenth street to the Battery, is, in a great measure, defective, and inadequate to the necessities of the dense population which covers or occupies that section. I have only to refer to the reports of Inspectors of the Eighth, Ninth, Tenth, Eleventh, Twelfth, Thirteenth, and Fourteenth Inspection Districts for specific details, and it will readily be seen that the matter of sewerage, including the complicated questions

arising from "tidal reflux," offers a problem to the engineers of the Department of Public Works, the successful solution of which would effect a remarkable change in the character and sanitary condition of the whole east side of the town.

The evil results of defective sewerage in the older portions of the city have been strongly marked in the sanitary record of the city in days past, and are again strongly expressed in the accompanying reports of the Inspectors of the First, Eighth, Ninth, Tenth, Twelfth, Thirteenth, Sixteenth, Seventeenth, and Eighteenth Districts.

Inspector Viele, of the Seventeenth District (Fifty-ninth to One Hundred and Tenth street, between Central Park and East river), says: "The principal sanitary features which develop themselves are the result of progressive city improvements, complicated by a want of proper drainage, by the filling of low places with improper materials, and by the opening of new ground for building purposes;" and, particularly in connection with the fact that a very large number of public and charitable institutions are located within the limits of this district, he calls attention to the necessity of a more systematic and thorough attention to the subject of proper drainage. His remarks upon the management of the "old water courses," during the present formative period of the city's growth, are well worthy the attention of the Department of Public Works, and his suggestion that "it is the especial duty of the Board of Health to give a close sanitary supervision to all the improvements now in progress, or in contemplation, in a district where there are so many charitable and public institutions, and where so fine a class of population must ultimately dwell," strikes the *key-note* of that harmony of interest and action which is so indispensable between the co-ordinate departments of the city in the great work of preparing and beautifying this island for the use of its present and future population.

Equally forcible and appropriate are the remarks of his colleague, Inspector O'Leary, of the opposite district, on the west side, between Fifty-ninth street and Spuyten Duyvil creek. "Defective drainage," says he, "is the root of *all* the unsanitary influences which curse the upper end of the island;" and no one who reads his exhaustive report on the topography and sanitary conditions of this part of Manhattan Island can for a moment doubt that the hurried, careless, and unscien-

tific manner in which splendid public improvements are now being pushed through, will entail upon the future city a far weightier burden of sanitary trouble than can readily be compensated for by broad avenues, splendid boulevards, or lovely parks.

Yet there is no reason whatever why the sanitarian and the civil engineer should not go over the ground hand in hand; "why," as the Inspector remarks, there should not "henceforth be a mutual understanding between the Department of Health and that of Public Works, by which no contract should be given out for the opening of streets until it is first determined what measures shall be taken for insuring an effective drainage" and other measures of sanitary precaution. The whole subject of drainage of swampy and sunken lots, etc., should be understood and corrected *now*, for, if not now, a serious inheritance of disease and death will fall to our successors.

It is but proper to say that much of the difficulty hitherto encountered in effecting proper sewerage or drainage of lands owned by private parties has been caused (in the case of the Health Inspectors) by the almost impossibility of ascertaining the names of owners, and, in the case of the Department of Public Works, by lack of legal right to drain private lands.

These difficulties, however, we hope will be overcome by the recent enactment of a law providing that such drainage, when necessary to the public health, may be done by the Department of Public Works, at the direction of the Health Board, the expenses being defrayed by a [illegible] assessment on the land and adjoining lands benefited by such drainage, as in case of other public improvements.

An erroneous impression seems to prevail that swamp lands, or lands through which original water-courses ran, lying below the level of street [illegible] can be made dry and healthy by filling in with earth to the [illegible] of the sewers.

Nothing more damaging to the future healthfulness of these localities could be devised. Were it impossible from the nature of the [illegible] to drain such low places at their natural levels, such measures might be resorted to as necessary expedients, but with the turtle-[illegible] of this island's surface no such procedure should be [illegible].

[illegible] original water-courses, when properly constructed into

drains, would become the underground drainage system so necessary for removing water from the soil which is to be the dwelling place of thousands, whose health would be thus secured. Medical and sanitary science and experience forbid erecting dwellings upon an undrained soil. Heat and capillary attraction bring to the surface that moisture and dampness which should have been removed by sanitary engineering. The result is malarial fevers and tuberculosis, suffering, and death, as punishments for neglected applications afforded by the light of science.

GARBAGE AND ASHES.

The much-vexed and never-settled question of how best to get rid of this class of nuisances still worries the patience and defies the experience of the Inspectors. They all agree, however, on the following points:

(1.) The necessity of devising some form of permanent, covered, and manageable receptacle for the use of tenants.

(2.) The necessity of a strict enforcement of the laws relating to garbage and ashes, by police aid, if it cannot otherwise be done.

(3.) The fact that this nuisance is less offensive in those houses which are provided with a resident housekeeper.

(4.) That much of the trouble experienced in getting rid of these nuisances is owing to the remissness, carelessness, and neglect of the employés of the contractors engaged to remove it.

(5.) That, if the contractors would co-operate with the Board in the removal of garbage and ashes, in accordance with that section of the Code *providing for separate receptacles for each*, much of the present difficulty would be removed.

The people are not encouraged to assume the trouble of placing garbage and ashes in separate vessels, when they see the gatherers empty both vessels into the same cart for removal.

Until some plan is organized for removing garbage by itself, that ordinance compelling it cannot be enforced, but when the public generally observe an effort on the part of public contractors to keep ashes separate from garbage in its final removal, this much-desired ordinance can be made of great public benefit.

In other cities, where there is a system of separate collection in force, the garbage is made an article of very large profit, while the ashes

form the best material that can be applied to the filling up of sunken lots and grading streets.

In this connection, also, I would call attention to Inspector Judson's remarks in regard to the disposition of refuse material brought into the city by emigrant vessels, and the necessity of maintaining a general quarantine supervision over these, as well as West India vessels, during their stay in port.

Rag and bone chiffoniers should also be made objects of a stricter sanitary supervision and not allowed to form large deposits of their pickings in basements, cellars, yards, or garrets of occupied houses, but should be compelled to transfer such material immediately to wagons for conveyance to properly regulated depots beyond city limits.

CLEANING OF STREETS.

During the past year a marked improvement in the condition of those streets heretofore habitually in a filthy condition has taken place. Under the requisitions of the Board for extra cleaning, the streets of the Fourteenth, Sixth, and portions of the Seventeenth and Eleventh Wards were cleaned daily during several months of the warm season, with the result of a decided increase in the salubrity, and of removing one of the prime causes of the persistence of relapsing fever in those densely populated districts. The direct benefit thus secured to life and health far more than counterbalanced the cost.

Keeping the streets clean is a fundamental sanitary method of promoting the public health and reducing the death rate. Sections of the city, densely populated as they are in tenement house districts, reek with the filth thrown upon the streets from day to day; garbage and house slops form decomposing masses of filth, which, under the influence of solar heat during the hot months, generate such poisonous gases as directly induce those diarrhœal diseases which swell the mortuary records of those months.

YARDS, AREAS, AND ALLEYS.

As before stated (Tenement Houses) there is a manifest improvement in regard to keeping of these places; but a serious impediment to their being properly kept is to be found in defective grading and paving.

DEMOLITION OF DANGEROUS AND UNSAFE BUILDINGS.

Several inspectors speak gratefully of the action of the Department of Buildings in the demolition of a number of old buildings, especially in the Fourth and Sixth Wards, which have long been eye-sores to our Board, but could scarcely be reached by the powers vested in this department.

STABLES.

The special survey of stables ordered by the Board, in the early part of the present year, resulted in a valuable amount of information, which is embodied in the accompanying report (marked K).

The inspectors agree in saying that these "necessary evils" in our midst require the constant and rigorous administration of the Health Laws in relation to their care; and Inspector Janes speaks pointedly in regard to the necessity for the regular, free, daily use of disinfectants in all these establishments.

CARS.

Inspector Leo, through whose district quite a number of street railways pass, calls attention to the necessity of gates to enclose the front platforms, and to the disadvantages of upholstered seats in these cars. Inspector Morris suggests the introduction of permanent ventilators in cars.

STREET PAVEMENTS.

Many streets, from the imperfections and irregularities in their surface, present unfavorable sanitary conditions. The old cobble-stone pavement should be rapidly removed, presenting as it does those depressions and irregularities which invite filth and promote accumulation of stagnant pools of water.

When out of repair, the damage produced upon the nervous system, to say nothing of the wear and tear of vehicles and cruelty to the animal creation, is such as to demand their substitution by a more uniform surface, and consequently better sanitary condition. Cleanliness is an impossibility in such streets.

The Department of Public Works has remedied many defects during the past year in the more public thoroughfares, but those streets adjacent and parallel to the water sides, and at right angles therewith in the Fourth, Seventh, Ninth, Sixteenth, Twentieth, and Twenty-second

Wards, are still in much need of repair or substitution. The almost universal testimony of the Health Inspectors is in favor of the small stone-block pavement, as presenting fewer sanitary objections than almost any other.

STREET IMPROVEMENTS.

In the widening of hitherto narrow, closely inhabited streets, now in progress under the direction of the Department of Public Works, a much needed sanitary reform is taking place. These improvements stalk through rows of old rookeries, open many dismal corners and slums, and let in sunlight, air, and life on many spots which for years have defied the efforts of sanitarians and philanthropists, scattering their miserable debauched inmates into other and more elevating homes.

FACTORIES AND WORKSHOPS

Are affording a large number of complaints, on account of the smoke, etc., thrown off, especially from those where sawdust and shavings are chiefly used as fuel.

Under section 110 these nuisances have been, in many cases, abated by the construction of smoke-consumers, to the satisfaction not only of the suffering neighbors, but, in many instances, to that of the owners themselves. There are really but very few men who are willing to be, or cause nuisances to their neighbors; and when, in addition to being relieved from such an imputation, they find their own comfort, as well as the effectiveness of their machinery improved (as not infrequently happens) by the improvements suggested by the Inspectors, they readily comply.

An abatement of the smoke nuisance, it is found, can be effected in almost every instance, by some peculiar and comparatively inexpensive adaptation to the exigencies of the case. In the Third Inspection District are several plaster mills and a lime-kiln, which are serious nuisances by reason of the minute particles of dust which escape from their chimneys, ventilators, etc., to the great annoyance of the residents of those localities, who are thereby compelled either to keep closed doors and windows, or to breathe constantly an atmosphere loaded with mechanical impurities.

PUBLIC FREE BATHS.

The introduction of these much-needed adjuvants to the sanitary regeneration of our population meets with the cordial indorsement of the Inspectors of the Board, who express a hope that the number will be increased until our metropolis shall offer the proper facilities for all who appreciate the advantages of personal cleanliness.

The introduction of some simple, easily managed form of bath-room in tenant houses, in the proportion of one bath-room to every four or six families, would be a wonderful gain in the work of sanitary reform, but cannot at present be effected unless made compulsory by law.

In this connection we may advert to the general insufficiency of water supply in tenement houses, especially where there are front and rear buildings on the same lot, one hydrant in the common yard being the only source from which 10 to 40 or 60 families can procure the water necessary for all their domestic and personal necessities. If water were made more accessible it is believed that cleanliness would be more general; but a hardworking laborer or his wife or children can scarcely be induced to use water with that freedom which is essential to health, when its use entails the additional labor of lugging it by pailfuls up five or six pair of dark, narrow tenement-house stairs.

METHODS OF CONTROLLING THE SPREAD OF CONTAGIOUS DISEASES.

The Board having adopted a code of sanitary ordinances—by which it is made the duty of physicians and others having knowledge of any disease of a contagious character, to report the same to the Bureau of Sanitary Inspection (sections 122 to 129 inclusive)—is thereby afforded the knowledge of the presence of such disease.

Special blanks are provided for this purpose, of which the following is a copy:

Report of contagious disease.

"New York, 187 .

To Dr. Moreau Morris,
City Sanitary Inspector,
301 Mott street, N. Y.

Name of patient Age
Residence Disease
Condition of premises

Signed, M.D.
Residence, "

In this Bureau a daily record is kept of all such reports, upon the receipt of which the Health Inspector of the district in which it occurs is immediately notified by telegraph, and thereupon visits the case, and reports back by telegraph to this office what measures are necessary. These measures are judged of by the circumstances surrounding each case, no unvarying rule being applicable to all.

If in the judgment of the Health Inspector, upon a personal examination of the case and its surroundings, he deems it necessary for the public protection that it should be removed to hospital for isolation, and provided the patient is willing to go, he immediately telegraphs the fact to the central office, and an ambulance is despatched for the purpose; if, however, the patient declines or refuses to leave his home, a joint report upon the visit of a second Health Inspector is made out, andthereupon an order is issued from the City Sanitary Inspector for the removal, and if necessary the police force is called upon for assistance, the power of removal having been lodged in the Board of Health by statute, whenever, in its judgment, public necessity demands it.

In the execution of this duty, all the facts and surrounding circumstances are carefully weighed, and whenever it is deemed prudent or justifiable with due regard to the public safety, the patient is allowed to remain in his own premises.

As by far the largest proportion of such diseases have occurred in tenement houses, occupied by large numbers whose lives and health demand from health authorities their protection, it has unfortunately not unfrequently been a necessity to compel the removal against the wishes of friends and patients.

Granting the annoyances caused by such measures to the individual, yet resistance to removal cannot but be regarded in the light of selfishness; for in repeated instances, when a contagious disease has recurred upon the same premises, those formerly resisting the removal of their friends become clamorous for the removal of their neighbor, fearing the danger to their own persons. Several noble instances of self-sacrifice have come under our observation, in marked contrast with this selfishness, where persons, rather than expose their families or others to disease, have voluntarily gone to the hospital.

In order to simplify the labors of the Health Inspectors, and afford

a much needed general information as to the sanitary care of these cases when patients remain in their own homes, the following card of instructions is furnished by the Inspectors to those whom they visit upon such occasions, and general instructions are given with reference to the quarantine to be maintained by the attendants in each case.

"HEALTH DEPARTMENT,
"OFFICE, 301 MOTT STREET.

"SANITARY REGULATIONS AGAINST SMALL-POX, SCARLATINA, MEASLES, AND RELAPSING FEVER.

"Every case must be reported to the City Sanitary Inspector upon its first recognized appearance.

"*Care of Patients.*—The patient should be placed in a separate room, and no person except the physician, nurse, or mother, allowed to enter the room, or to touch the bedding or clothing used in the sick-room, until they have been thoroughly disinfected.

"*Infected Articles.*—All clothing, bedding, or other articles not absolutely necessary for the use of the patient, should be removed from the sick-room. Articles used about the patient, such as sheets, pillow-cases, blankets, or clothes, must not be removed from the sick-room until they have been disinfected by placing them in a tub with the following disinfecting fluid: eight ounces of sulphate of zinc, one ounce of carbolic acid, three gallons of water.

"They should be soaked in this fluid for at least one hour and then placed in boiling water for washing.

"A piece of muslin, one foot square, should be dipped in the same solution and suspended in the sick-room constantly, and the same should be done in the hallway adjoining the sick-room.

"Feather beds and pillows, hair pillows and mattresses, and flannels or woollen goods, require fumigation, and should not be removed from the sick-room until after this has been done. Whenever the patient is removed from the sick-room, notify the Bureau of Sanitary Inspection, when the disinfecting corps will as soon as possible thereafter perform the work of fumigation.

"All vessels used for receiving the discharges of patients should have some of the same disinfecting fluid constantly therein, and immediately after use by the patient be emptied and cleansed with boiling water. Water-closets and privies should also be disinfected daily with the same fluid, or a solution of chloride of iron, one pound to a gallon of water, adding one or two ounces of carbolic acid.

"All straw beds should be burned, but must not be removed from the sick-room without a permit from this department. They will be removed by the disinfecting corps.

"It is advised not to use handkerchiefs about the patient, but rather soft rags for cleansing the nostrils and mouth, which should be immediately thereafter burned.

"The ceilings and side-walls of the sick-room after removal of patient should be thoroughly cleaned and lime-washed, and the wood-work and floor thoroughly scrubbed with soap and water.

"By direction of the Health Department,

"MOREAU MORRIS, M.D.,
"*City Sanitary Inspector.*"

Whenever small-pox cases are isolated at their own homes, the upper floor of the house is generally selected, where there is the least liability for communication. This secures the needed ventilation for the patient with due regard to the possible danger of infecting others. By the constant application of disinfectants such as are now employed by the Board, with the thorough fumigation of rooms and clothing, and burning of the bed used by the patients after their removal from the room, it may be possible to prevent infection from spreading.

But experience has abundantly demonstrated the fact that, with few exceptions, these sanitary measures are but indifferently performed by those having the care of patients, and the consequent conclusion is that hospital isolation is the only safe means which can be effectively applied to arrest or prevent the spread of such a loathsome disease as small-pox, whenever it assumes an epidemic form.

Vaccination.—For the protection of the public health, the Board appoint from time to time an extra force of Assistant Medical Health Inspectors, whose special duties are offering free vaccination from house to house in all tenement houses.

The work is done by subdividing the districts and arranging the extra assistants under the supervision of the District Inspectors, who are held responsible by the Chief of the Sanitary Inspection Bureau for the faithful and regular performance of such duties.

In the selection of the virus great care is used, it all being daily inspected at the central office before being distributed to the Inspectors. If any imperfect or objectionable points are discovered they are rejected. Such virus only is used as is obtained from children selected with special reference to healthy conditions.

The work of vaccination having been commenced this year but a few days prior to the date of this report, no satisfactory statistics of results can be afforded at present.

The vaccination in public schools, being considered as one of the fundamental means of protection from small-pox, has been put under a thorough organization, a special corps of Inspectors having been detailed for the work.

The Board of Education, recognizing the importance of vaccination as a sanitary measure, have incorporated in their by-laws a section requiring all children attending public schools to be vaccinated as a prerequisite for their admission.

They have also appointed a Physician (Dr. J. O'Sullivan) whose special duties are with reference to the sanitary care of the schools. By the co-operation of the Board of Education, and the efficient assistance rendered by Dr. O'Sullivan in preparing the schools for the vaccinators, their labors have been greatly facilitated and the objections heretofore made against this most important measure have been removed. All the children are carefully examined, and only those presenting unsatisfactory evidence of protection are vaccinated. The work being now in progress in a most thorough manner, it is as yet impossible to give a record of statistics.

SPECIAL MEANS FOR ARRESTING AND PREVENTING THE SPREAD OF CONTAGIOUS DISEASES, AND FOR GENERAL DISINFECTION AS APPLIED UNDER THE DIRECTION OF THE SANITARY BUREAU.

For this purpose a special corps has been organized by the Board, whose duties are supervised by the Assistant Chemist H. Endeman, Ph.D.

These duties have been efficiently performed under the applications of scientific chemical knowledge, and have succeeded in accomplishing positive results, such as have been heretofore deemed only problematical.

In these applications relapsing fever has ceased to be an uncontrollable mystery, and although its fermentative element cannot be demonstrated, it can be controlled in its movements, and destroyed or eradicated in its wonted habitats.

The same may be asserted with reference to other contagious elements, such as typhoid and typhus fevers and small-pox; and it is possible by the applications of scientific sanitary and chemical knowledge to prevent the spread of scarlatina or measles.

The following report of the Assistant Chemist in charge of this subbureau is so full and replete with interest to the practical sanitarian, that its value and importance cannot be over-estimated. It is a practical experience in the application of science against disease, and its results have been unquestionably an advance in sanitary science.

REPORT OF THE ASSISTANT CHEMIST

ON DISINFECTION.

To MORKAU MORRIS, M.D., *City Sanitary Inspector:*

SIR—I have the honor to submit the following report upon the methods of disinfection and the amount of work performed by the Disinfecting Corps during the past year.

The work as performed by the Disinfecting Corps during the year 1870, comprised the disinfection of street gutters, public markets and places, and especially the disinfection of houses infected with contagious diseases.

The Disinfection of Streets, as performed by the Disinfecting Corps, was commenced on June 3d, and with the exception of rainy or otherwise unfavorable weather continued up to the end of November, when frost and snow preventing the fermentation of the fæcal and other organic matter, made this sanitary measure unnecessary. The first month was partially devoted to experimenting with various disinfectants. During this period the following substances were tried:

(*a.*) Dead oil or heavy oil of coal tar. This substance is a product of the distillation of coal tar. When coal tar undergoes fractional distillation, the substances composing it pass into the condenser in this order: naphtha, benzine, carbolic acid, and heavy oil of coal tar, leaving pitch behind. As by this process these substances cannot be kept apart entirely, all products will be more or less rich in carbolic acid, and it is to this substance that the value of dead oil as a disinfectant is due.

The dead oil now in the market is freed from this valuable ingredient by treatment with soda. An analysis of the commercial dead oil now in the market showed this, and there was also a great difference in the effects. This article is much weaker than it was in previous years, when it was not deprived of its carbolic acid. The dead oil was applied by means of sprinkling-cans, but as it is naturally rich in naphthalin, which during the cooler months is apt to crystallize, we met with some difficulty, caused by the frequent stoppage of the holes in our sprinklers. Since the treatment of the heavy oil with soda has become general, I was satisfied this article is no longer a reliable disinfectant; its use was therefore soon abandoned.

(*b.*) Sterry's and Alexander's carbolic powders. The basis of these substances is white clay, which is, by some process entirely immaterial, impregnated with either dead oil, or a low grade of carbolic acid.

Some of the samples contained a carbolic acid of fifteen per cent., others merely dead oil to the extent of from four to five per cent. The value of the powder, therefore, ranges from three dollars and thirty cents to ninety cents per ton. The powder is of a dark color and a decided tarry smell. It was offered to the Board at two hundred and twenty dollars at first, and afterwards at sixty dollars per ton, but as analysis showed it to be almost worthless, only two barrels, containing about three hundred pounds of the powder, were actually purchased for experiment. Disinfection of gutters with this preparation gave very unsatisfactory results.

(*c.*) Mixture of chloride of lime and lime. This mixture appeared to be very valuable; the results obtained with it were excellent; nevertheless its use was abandoned. If the chloride of lime be added to the lime, a short time after it is slacked, while it is

yet warm, the chloride undergoes decomposition, the hypochlorous acid being converted into chloric acid, which has, when combined with lime, no disinfecting properties. Much time, therefore, was consumed in preparing the mixture, there being no place under the control of the Board where the slacked lime could remain over night to cool.

(*d.*) Lime. I consider lime the cheapest and most effectual disinfectant that can be used for the disinfection of gutters. We have used it during the greater part of the summer in the worst places in the city, and always with satisfactory results. The *modus operandi* is as follows: The lime is always slacked on the day it is to be used, and then carted to the streets which are to be disinfected. It is distributed by means of shovels, which being filled with lime are carried over the filthy spots. A slight shaking motion scatters the lime, completely covering the spots with a uniform layer. The disinfection is almost immediate and lasts for many days, provided the lime is not removed by rain or running water.

According to the order of the Board the disinfection of gutters was performed only in those streets or wards where relapsing fever had been found to exist, that is in the most filthy and thickly populated parts of this city.

The results of our work as performed from June 3d to November 11th, 1870, are given in the following tabular statement:

	JUNE.	JULY.	AUGUST.	SEPT.	OCTOBER.	NOV'R.	TOTALS.
Streets disinfected (miles)	16½	59	72	29½	41	16	234
Amount of labor (days)	20¼	41	51½	36	45½	18	215¼
Quick-lime used (barrels)	19	113	148	108	209	72	669
Chloride of lime used (pounds)	200	.....	.....	.....	.....	.....	200
Dead oil of coal tar (barrels)	25	.....	.....	.....	.....	.....	25
Cost of labor	$50 63	$123 00	$163 50	$108 00	$136 50	$54 00	$635 63
" disinfectants	129 70	146 90	193 40	140 40	271 70	93 60	974 70
" storage	.....	2 50	2 50	1 50	1 00	.....	7 50
Totals	$180 33	$272 40	$358 40	$249 90	$409 20	$147 60	$1,617 83

The above statement shows that during this summer 234 miles of street were disinfected at a cost of $1,617.83, or one mile at an average cost of $6.91.

The streets, alleyways, and places (in all 132), which were at intervals disinfected during the summer, were:

Greenwich and Washington streets, and cross-streets in the First, Third, Eighth, and Ninth Wards.

West Broadway and some cross streets in the Fifth Ward.

Fulton street and some of its parallel streets in the Second Ward.

Nearly all the streets of the Fourth, Sixth, Fourteenth, Tenth, Seventh, Thirteenth, Eleventh, and Seventeenth Wards.

Greene street and its parallel streets to Sullivan street in the Eighth Ward.

The streets from Fourteenth street to Twentieth street, east of First avenue, in the Eighteenth Ward.

Ninth, Tenth, and Eleventh avenues, from Sixteenth to Fifth-fourth streets, and cross streets in the Sixteenth, Twentieth, and Twenty-second Wards.

Disinfection of Infected Tenements.—Fresh air and pure water, constant ventilation and thorough cleansing are natural means of preventing and destroying the causes of infection and disease. Notwithstanding this and the easy access to water, there is in many, and those generally the more densely peopled wards of this city, much less water used than there should be. The consumption of water in New York is by no means equal to that of ancient Rome, the best watered city of ancient or modern times.

In general, we find the working classes least ready to recognize the value of an abundance of water. If they are hard-working men, we find them seldom affected by the dirt on their skin and in their tenements, for the lungs during the excitement of hard work remove by combustion the impurities from the blood. But such unfortunates as are obliged to work late are exhausted without profiting by excitement, and their systems become charged with the products of decomposition, which task lungs, liver, and kidneys to the utmost in their endeavor to remove the impurities from the system. These are the persons who should be most careful to keep their pores open and the surrounding air clean by a frequent use of water. They are the ones that are most liable to receive and develop contagious diseases. From neglect on their part to remove the filth from their abodes, it becomes necessary to protect them by other means, which either transform the decomposing matter by chemical action or by arresting fermentation. These means of protecting the public health become an absolute necessity during the prevalence of contagious diseases in the community.

Excellent and startling results were obtained when the disinfectants were applied under conditions approved by chemical science. Without this precaution the results become doubtful and uncontrollable. I have frequently observed that even physicians did not select their disinfectants or employ them properly. I have often seen them prescribe for disinfection Labarraque's solution and carbolic acid, to be used together, for the purification of the air in sick-rooms. I have also seen that for certain purposes they ordered washing with a *hot* solution of chloride of lime or soda, not being aware that they destroy all the disinfecting properties of these substances by applying heat. How many more mistakes are probably made by men, women, and children unacquainted with the laws of chemistry! How few are able to appreciate the connection of the disease and the dirt and filth surrounding them!

I shall try to give below the results of our experience with regard to the action of the disinfectants and their proper manipulation, when they are applied in cases of different diseases, as approved by the Board of Health of the City of New York.

The disinfectants used may be classified in two groups:

I. Disinfectants which arrest fermentation. Carbolic acid, and carbolic acid preparations. Sulphates of zinc and iron. Sesquichloride of iron.

II. Disinfectants which affect chemical decomposition. Chloride of lime and soda. Sesquichloride of iron. Chlorine. Lime. Sulphurous acid.

I.—Disinfectants that Arrest Fermentation.

Each of the disinfectants of this class is either employed alone or mixed with one of the same class.

1. Carbolic acid or carbolic acid preparations are derived from coal tar. They act by their effect on albumen and albuminous substances, which are coagulated. The better

qualities are used for fumigation of rooms and disinfection of bedding and clothing. Carbolic acid containing about 70 per cent. of the pure acid is used for the disinfection of basements, cellars, and privies.

2. Sulphate of zinc is used in aqueous solution as a disinfectant for clothing and bedding.

The following solutions are in use:

a. Sulphate of zinc.....8 ounces.
Water.....3 gallons.

b. Sulphate of zinc.....8 ounces.
Carbolic acid.....1 ounce.
Water.....3 gallons.

3. A concentrated solution of protosulphate of iron is used for the disinfection of damp cellars and yards. This solution may for the same purposes be mixed with a low grade carbolic acid.

4. A solution of sesquichloride of iron, of 1.30 specific gravity, is used either alone or mixed with 10 per cent. of carbolic acid for the disinfection of privies.

II.—Disinfectants that Effect Chemical Decomposition.

5. Chloride of lime. Fermentation of filth may be readily checked by its use; it destroys the germs entirely, provided that the substance to be disinfected is not too dense or too large in mass. It proved a valuable disinfectant in cases of relapsing fever and other malignant fevers. It is either used dry, sprinkled on the floors of the apartments, or better in solution. The floors and woodwork of the rooms to be disinfected should be washed with it. In damp places I prefer a mixture of chloride of lime and carbonate of soda to avoid the hygroscopic properties of the chloride of calcium.

6. Sesquichloride of iron is prepared by dissolving bog ore (hydrated sesquioxide of iron) in muriatic acid. It acts in a double way. On account of its metallic nature it checks fermentation, and on account of its excess of chlorine it acts as an oxidizing agent. By using it as a privy disinfectant we take advantage of both of these properties. The further decomposition is checked by the presence of the iron compound, while one of the most poisonous products of decomposition, the sulphuretted hydrogen, is readily decomposed. If the solution of the sesquichloride is too acid, more sulphuretted hydrogen may be developed than can be decomposed by the surplus chlorine. Care, therefore, must be taken to avoid the use of a solution which contains more acid than is necessary for the solution of the sesquioxide of iron. The solution of the sesquichloride of iron with 10 per cent. carbolic acid, known as Metropolitan Disinfecting Fluid, ought not to be prepared a long time before its use, the sesquichloride being liable to reduction by the carbolic acid, which at the same time undergoes decomposition.

7. Chlorine gas was used extensively in houses infected by contagious fevers, and appeared to be very effective. It has, therefore, been used in nearly all cases of relapsing fever. The house No. 281 Mott street had been a constant source for this disease; twenty-three cases were removed previous to the middle of May. The house was then thoroughly disinfected by washing the floors and woodwork with a solution of chloride of lime. It was then fumigated with chlorine, and, finally, the walls and ceilings were whitewashed. Not a single case has occurred there since. The chlorine gas is made from chloride of lime and muriatic acid.

8. Lime, which acts by its alkaline properties, proved to be the most valuable disinfectant for gutters and yards. It completely destroys microscopic vegetation and animal germs, uniting with the acids formed during the process of fermentation. It thus frees the gutters from foul smells.

9. Sulphurous acid is used for the fumigation of rooms, etc. We prepare it at the place to be disinfected by burning sulphur. It acts as a preventive of fermentation, and most likely also as a deoxidizing agent. It is acknowledged to be the most thorough disinfectant for the destruction of the contagions of small-pox, scarlatina, and yellow fever.

APPLICATION OF DISINFECTANTS IN SPECIAL DISEASES.

In the following pages I will give a description of the manner in which the disinfectants are employed in special cases. The manipulations are always adapted to the actual requirements of each case, and are as thorough as possible under the circumstances. They may vary somewhat with the local circumstances, but in general the following represent the practice. One of two conditions may occur at the outset which will govern in the selection of the disinfectants:

1. The patient is still living and on the premises.

2. The patient is either dead, or has been removed to hospital or some other locality.

In the first case the disinfection can be only a partial one, and good results are only obtained when the persons in charge of the sick carefully follow our established rules by renewing the disinfection frequently, for which purpose they are liberally supplied by the Board with disinfectants.

In the second case the disinfection is considered final, and the persons in charge of such disinfected rooms are obliged to thoroughly clean and air them before they can be reoccupied.

General Directions for the Disinfection in Cases of Small-Pox, Scarlatina, Measles, Diphtheria, and Yellow Fever.

1. The patient is still living and on the premises to be disinfected.

The sick-room must be kept well ventilated, but with such precautions that the sick shall not lie exposed to draughts. Pieces of cloth are soaked in a diluted aqueous solution (1 : 200) of carbolic acid, and suspended in various parts of the room and adjoining hallways to keep the air saturated with the vapors of this disinfectant. These should be frequently renewed. Fumigation with carbolic acid is also and with better effect performed by pouring some of the solution on a hot stove or on a heated coal shovel. The disinfection with the vapors of carbolic acid is not very effectual, and therefore we must make it a rule to use it as freely as possible without disturbing the sick.

All vessels used for receiving the discharges of patients should have some of the disinfecting fluid, which is used for clothing, therein, and immediately after use by the patient be emptied and cleansed with boiling water. Water-closets must be kept extremely clean, and privies be thoroughly disinfected. The Metropolitan Disinfecting Fluid, or a low grade carbolic acid, is used for the latter purpose.

All the clothing and bed-clothes which were in contact with or used round the sick must be disinfected by soaking them in the disinfecting solution for one hour before they are allowed to be taken from the room. A solution of eight ounces of sulphate of zinc

and one ounce of carbolic acid in three gallons of water, is used for this purpose. After the disinfecting solution is removed the clothing is to be boiled and then washed in the ordinary way.

2. The patient has recovered, has been removed to the hospital, or is dead. In the latter case the corpse is disinfected by wrapping it in sheets which are wetted with a solution of carbolic acid. In all three cases the following rules must be complied with:

Clothing and bedding are disinfected as above, or burned whenever possible.

Then the windows and doors leading out of the infected rooms are closed, and these fumigated by burning sulphur. They must remain under the action of the sulphurous acid from two to six hours. A common tenement room requires about two pounds of sulphur, which are burned in a sheet iron pan that is supported by an iron stand about nine inches high.

In case a whole house is to be fumigated, one or two pans for each floor, charged with two pounds of sulphur each, are placed in the halls, all windows being tightly closed, and all interior doors of the building opened.

Fumigation should only be performed during dry weather.

Water-closets and privies must be disinfected, and also yards, cellars, and alleyways, whenever they are in a bad condition.

After fumigation is performed, the floors and wood-work are to be scrubbed, and then the rooms to be well aired for some time.

General Directions for the Disinfection in cases of Relapsing Fever, Typhus and Typhoid Fever.

1. The patient is still living, and on the premises. The sick-room must be kept well ventilated, and then chloride of lime either sprinkled round or divided on several plates throughout the room and the adjoining halls and stairways. A solution of ten ounces of sulphate of zinc in three gallons of water is used for the disinfection of the clothing and bedding before they are washed.

Vessels used for receiving the discharges of the sick should have some of the same disinfecting fluid therein, and immediately after use by the patient, should be emptied and cleansed with boiling water. The privies are disinfected with the Metropolitan Disinfecting Fluid.

2. The patient is removed or dead. The floor and wood-work are scrubbed with a solution of chloride of lime or soda, the latter obtained by mixing solution of chloride of lime and washing soda.

Clothing and bedding are disinfected with a solution of ten ounces of sulphate of zinc in three gallons of water.

The infected rooms and articles are then fumigated with chlorine gas, which may easily be obtained by mixing chloride of lime with muriatic acid.

After such treatment, the rooms must be well aired for some time, and whitewashed.

The privies are disinfected with the solution of perchloride of iron with carbolic acid, or a low grade of carbolic acid.

Yards, alleyways, and cellars are disinfected with either a solution of copperas with ten per cent. of carbolic acid, or with chloride of lime.

The following table will show the amount of work performed during the year 1870, in houses infected with contagious diseases.

MONTHS.	Relapsing Fever.	Typhus Fever.	Typhoid Fever.	Yellow Fever.	Small-pox.	Scarlatina.	Diphtheria, Measles, etc.	Whole number of visits.	Partial disinfection.	Thorough disinfection and fumigation.	Cases erroneously reported.	Patients removed to hospital.	Disinfected bedding and clothing.	Disinfected privy and yard.
1870.														
January	.....	5	.....	.....	489	.....	.....	504	445	59	.....	.....	100	10
February	47	5	.....	.....	424	.....	.....	476	397	78	1	25	93	29
March	108	4	2	.....	462	.....	.....	576	383	144	.....	69	163	169
April	154	.....	.....	.....	309	.....	.....	463	204	219	2	38	271	216
May	227	.....	.....	.....	178	.....	.....	405	102	208	57	90	259	223
June	183	.....	.....	.....	137	.....	.....	320	81	158	82	85	156	110
July	157	.....	.....	.....	26	.....	.....	183	44	62	70	53	81	90
August	118	5	44	.....	16	.....	.....	183	61	72	41	62	73	58
September	122	6	77	4	3	3	.....	215	78	73	30	80	70	95
October	68	15	74	5	4	42	11	200	101	68	21	32	56	103
November	34	17	97	1	11	109	28	387	272	37	37	25	127	134
December	19	9	54	1	17	214	23	336	149	109	13	23	238	178
1871.														
January	30	4	19	.....	90	133	23	299	116	148	14	73	259	163
February	9	3	14	.....	178	93	2	296	80	200	4	137	285	190

Respectfully submitted.

HERMANN ENDEMANN, Ph.D.,
Assistant Chemist.

REMOVAL OF NIGHT SOIL.

The contract for removing night soil from the city having been abandoned by the contracting party, the Board directed the City Sanitary Inspector to make a special contract by the day for its removal.

In the execution of this work boats are provided at three several points upon the river sides, which receive the contents of the privies from the night scavengers, for removal beyond the limits of the city.

During the year the total number of permits issued to the scavengers for cleaning privies and cesspools, was..... 5,963

Total number reported cleaned..... 5,783

" " of loads of night soil removed..... 22,661

In the cleaning of privy vaults, the scavengers are required, in every instance, to disinfect the contents before removal; and the universal testimony is, that it is now done in such a manner as to avoid that offensiveness formerly attending this work. The disinfecting fluid used is prepared and sold to the scavengers at the lowest rates by parties not connected with the Department; but its quality and standard are frequently tested and examined by the Assistant Chemist. Its ingredients will be found by referring to his report.

The new Charter of this city, passed during the winter of 1869 and 1870, by the Legislature of the State, has, in its organization of Departments, achieved an harmonious co-ordination, under one general system of government, that at the end of its first year has already elicited encomiums from its most bitter opponents.

Each Department, although governed separately by its own head, feels that it is but a part of a whole, and that its own individual interest is but a part of one common interest which all must sustain for the welfare of a well-governed metropolis.

In the execution of the laws relating to public health, the Health Department, through its different Bureaus, is brought intimately in contact with nearly every other Department of the city government, and as Chief of the Bureau of Sanitary Inspection, I cheerfully testify to the uniform courtesy and prompt co-operation manifested by each of them in all our official relations.

Respectfully submitted. Your obedient servant,

MOREAU MORRIS, M.D.,

City Sanitary Inspector and Sanitary Superintendent.

FIRST SANITARY INSPECTION DISTRICT.

INSPECTOR—W. F. DEMING, M.D.

NEW YORK, April 1, 1871.

MOREAU MORRIS, M.D., *City Sanitary Inspector, &c.:*

SIR—I respectfully submit the following annual report upon the general sanitary condition and the changes that have taken place in the First Inspection District, which is bounded as follows: north, by Canal street; east, by Broadway; south, by Battery place; west, by the North river; and includes the entire Third and Fifth Wards, together with the greater portion of the First Ward. There are six hundred tenement houses in the district, containing, in the aggregate, twenty-five thousand inhabitants.

Topography.—The topography of this district is not conducive to public health, for the particular reason that nearly all the ground lying west of Greenwich street is what we call "made soil," and composed of the refuse of the lower part of the city, such as dirt, ashes, and garbage.

Basements and Cellars.—The tide percolates through this porous soil and finds its way into the basements and cellars along the water side. Many of these damp apartments are occupied for human habitations, and the tenants suffer more or less from miasmatic diseases during the greater part of the year.

Since the passage of the Tenement-house Law this class of homes for the poor have undergone a radical transformation. They have either been vacated entirely or so altered as to conform with section six of said law.

Tenement Houses.—In the general condition of tenement houses, I am glad to report a decided improvement in comparison with former years. With very few exceptions, owners and lessees of this kind of property have cheerfully complied with any order or suggestion from the Health Department, and the result is a gratifying increase in the comfort and health of the occupants.

Streets.—The streets have been kept in much better condition than in former years. Many of the old worn-out cobble-stone pavements, which always presented an uneven surface for the reception and accumulation of filth, have given way to the more modern and improved pavements of the day.

Piers.—The improvements made in the condition of piers along the North river, from Canal street to the Battery, have been many and great.

Markets.—Washington Market has undergone a thorough renovation in its general appearance. Most of the old structure has been taken down, and a new building erected, with all the appurtenances of good ventilation, light, and drainage so essential to the preservation and wholesomeness of market produce.

Public Squares and Small Parks have received especial attention from the Commissioners of Public Parks, and the contrast with former years is well marked.

Contagious Diseases.—Small-pox, typhus, typhoid, and relapsing fevers, together with scarlatina and measles, have prevailed to a certain extent, but generally confined to the poorer class of society, and to apartments that are damp and poorly ventilated. Typhus and typhoid fevers have been on the decrease in comparison with former years. The same can be said of scarlatina and measles.

Small-Pox.—Despite the propinquity of the lower portion of this district to Castle

Garden, the great depot for the landing of emigrants that come to this country, I am glad to state that during the past twelve months there has been a less number of cases of small-pox in the First Ward than in any other quarter of the city. This result is owing to our strict quarantine regulations, and the immediate isolation of every new case.

General Remarks.—In conclusion, I would remark the striking evidences of the great improvement in our sanitary system, both as regards the prompt suppression of nuisances and the care of those afflicted with disease.

SUMMARY.

I have the honor of submitting the following summary of duties performed by me from April 1, 1870, to the 31st day of May, 1871:

Whole number of tenement house inspections and reinspections	1,649
Private house inspections and reinspections	119

LARD-RENDERING AND FAT-BOILING ESTABLISHMENTS.

Inspections and reinspections	43

FACTORIES.

Inspections and reinspections	20

STORES AND WAREHOUSES.

Inspections and reinspections	123

STABLES.

Inspections and reinspections	153

STREET GUTTERS.

Inspections and reinspections	69

PUBLIC BUILDINGS.

Inspections and reinspections	11

MARKETS AND MARKET PLACES.

Inspections and reinspections	21
Street inspections	84
Catch basins inspections	12
Street sewer inspections	2
Pier inspections	20
Sidewalk inspections	12
Vacant lot inspections	2
Cellar and basement inspections and reinspections	284
Number of contagious diseases visited	160
Number of stables in district	137

NUMBER OF COMPLAINTS MADE.

Tenement houses	294
Private houses	23
Cellars and basements	56
Privies	31
Streets and street gutters	61
Factories	11
Business houses	21
Dumping grounds	2
Stables	14

CONTAGIOUS DISEASES.

Small-pox	44
Relapsing fever	77
Typhoid fever	11
Varicella	3
Scarlatina	19
Rubeola	6

W. F. DEMING, M.D.,
Health Inspector, First District.

SECOND SANITARY INSPECTION DISTRICT.

ASSISTANT INSPECTOR—BERNARD HUGHES, M.D.

MOREAU MORRIS, M.D., *City Sanitary Inspector:*

SIR—I have the honor to report for the past ten months.

The Second Sanitary District comprises that portion of the city known as the Eighth Ward, bordering on the river, and bounded by West Houston street, Broadway, and Canal street.

Tenement Houses.—A decided improvement is noticeable in their condition, particularly with reference to ventilation.

The halls, floors, stairways, and ceilings of these buildings are now being kept in a more cleanly condition. The walls and ceilings are more frequently whitewashed, and in many cases the tenants are required to take their turn in scrubbing the floors of the halls and stairways, as well as the floor and seat of the privy buildings.

Basements and Cellars.—The basements and cellars in this district, which are occupied by families, show marked improvement in consequence of the rigid enforcement of the provisions of the Tenement-house Law. The number so occupied are in a good sanitary condition, being well ventilated, clean, and thoroughly drained.

Alleys, Areas, and Yards.—The majority of the alleys, areas, and yards, are kept in a fair sanitary condition, yet there are some of the areas constantly damp in consequence

of the surface water from the improperly graded yards which soaks into the ground and eventually finds its way into the areas.

Privy-vaults and Water-closets.—Most of the tenement houses are provided with privies connected with the street sewer. These vaults are flushed by the waste water from the hydrant, surface water from the yard, and in many cases, also, by the leaders from the roof. Some few have water-closets in the halls or cellars. These are generally found in a very filthy condition, owing to the carelessness of the frequenters, with respect to the flushing of the closet, which too frequently leads to the obstruction of the soil pipe and consequent filling up of the hopper. When this condition of things exists, the floor of the closet is usually made the receptacle for nature's calls.

Streets, Gutter and Curbstones.—The condition of the streets with respect to cleanliness has been unusually good during the past summer, though many of them are so unevenly paved that it is almost an impossibility to give them a thorough cleaning. Many of the curb and gutter stones have been taken up and relaid to a uniform grade.

It is highly gratifying to note the progress that has been made in the widening of Laurens street, and the obliteration of those old rookeries that had for so long a time disgraced this section of the district, and constituted such favorable foci for the propagation of disease.

Stables.—A slight improvement is noticeable in the condition of the stables in this district, although not so marked as could be desired.

There are numerous smaller ones to be found in every section of the district, which are usually located in the yards of tenement houses, the entrance for the horses being through the hall or alleyway adjoining the house; these smaller stables are generally found in a bad sanitary condition, and in most cases without a receptacle for manure.

SUMMARY.

The following is a tabulated statement of the number of inspections and reinspections made by me from June 1, 1870, to April 1, 1871:

Tenement-houses	Inspections,	955
Private "	"	285
Stores and private houses	"	283
" manufactories	"	89
Basements and cellars	"	180
Privies and water-closets	"	404
Stables	"	277
Lodging-houses	"	23
Boarding "	"	35
Lard-rendering establishments	"	7
Markets	"	1
Chicken butcheries	"	1
Unoccupied buildings	"	3
Vacant lots	"	2
Contagious diseases	"	119

Tenement houses	Complaints	forwarded, special,	311
Private "	"	"	32
Basement and cellars	"	"	75
Privies and water-closets	"	"	91
Lodging-houses	"	"	2
Stables	"	"	65
Sidewalks and gutters	"	"	79
Tenement houses	Reinspections,		406
Number of cases of contagious diseases visited			119
Small-pox			36
Relapsing fever			52
Scarlet "			17
Typhoid "			7
Cholera			4
Measles			3

Respectfully submitted,

BERNARD HUGHES, M.D.
Ass't Health Inspector.

NEW YORK, April 1, 1871.

THIRD SANITARY INSPECTION DISTRICT.

INSPECTOR S. F. MORRIS, M.D.

MARCH 10, 1871.

MOREAU MORRIS, M.D., *City Sanitary Inspector:*

SIR—I have the honor to present the following report of inspectorial labor performed by me since the 1st of June, 1870.

The district to which I was first assigned is bounded north by West Fourteenth street, east by Broadway, south by West Houston street, and west by the North river. In July my district was diminished by taking away that part lying east of Sixth avenue. Since December 1, 1870, I have had my original district.

The district is occupied principally by private dwellings, tenements, factories and stables.

Streets.—During the summer and fall of 1870 the condition of the streets was excellent. A few blocks could not be kept as clean as they should have been owing to want of repair, or because garbage and manure carts were allowed to stand in them when not being used, and collections of garbage and refuse accumulate around and under the carts. I would mention as such blocks the upper part of Washington street (between Gansevoort and Horatio streets), Little Twelfth street, Gansevoort street, etc.

Tenement Houses.—The tenement houses are, as a rule, in a very good condition, and the complaints against them are only such as may from time to time arise by accumulation of dirt, etc. The structural changes necessary for a *technical* compliance with sec. 2 of the Tenement-house Law have been made; but the sanitary benefit in many cases is very slight, owing to windows opening against a rear wall, or in inner sleeping-rooms, where a cross current cannot be established.

The only relief I could suggest for this would be to compel every new tenement house when constructed to be supplied with a ventilating shaft of good size covered with a skylight, the base to consist of lattice-work having free communication with each and every sleeping-room. In some houses this has been done and the benefit is very marked.

Factories and Workshops.—Of these there is a large number. The smoke from them is a great nuisance, more especially from those where sawdust and shavings are the chief articles of fuel. It is constantly issuing forth in dense volumes, greatly to the annoyance and detriment of those living in the neighborhood. There would be ample remedy for the relief of this if the requirements of the Sanitary Code (sec. 110) were fully complied with. In two or three instances where a smoke consumer has been constructed the benefit is very great. A very small amount of smoke escapes, and that is deprived of its offensiveness by the combustion of the carbon. Several factory owners have expressed their willingness to comply "if they knew what to do." This I do not consider a valid objection, as there are engineers in the city competent to give the necessary information.

There are several plaster-of-paris mills and a lime kiln which are very objectionable on account of the constant escape of dust during their operations. These I consider a great nuisance and one which should be remedied. No structural change that I can recommend would alleviate it, as the minute particles of dust escape from the chimneys, ventilators, etc. This is especially annoying, as it compels the neighbors either to keep their doors and windows shut, which is most deleterious to health, or to submit to breathing an atmosphere heavily laden with mechanical impurities.

Public Institutions.—I would only speak of the "swimming-bath" at the foot of Charles street. The numbers that visited this during the few months it was open attested sufficiently to its popularity, while as to its benefits the invigorating exercise and cleanliness it afforded cannot be spoken of too highly. I trust the number of these public baths may be greatly increased during the ensuing summer.

"Fresh Lard" Establishments, with the exception of those that use the steam-tight tank, have been compelled to have each kettle provided with a proper hood and to have free communication with the chimney. In this way the offensive odor are carried off and the nuisance abated. I think this mode of rendering far less objectionable than using the steam-tight tank, as in the latter such a great amount of heat is used that foul, fatty acids are set free, and the remaining scrap is very offensive from the rapid decomposition which takes place.

Contagious Diseases.—The greater number of cases of scarlatina seen were in private dwellings (containing three families or less), the sanitary conditions and surroundings of which were excellent. As regards its propagation, I consider the public schools a fertile source.

The first family I visited, where a case had occurred, I found that a son (aged twelve years) had come home from school "ailing;" he was kept home three days and then allowed to return to school. In about eight days his sister and cousin were taken sick with scarlatina (both cases were fatal), and at the time of my visit another cousin was sick with the same disease. The family did not know what was the matter with the boy, and had no physician in attendance; but, when the others were taken sick, they recog-

nized the first as a case of scarlatina. Here there was a source of contagion to his playmates, and I doubt not it was a very fruitful one, as I had several cases among the scholars of that same school. Another case—a girl—gave a clear history of exposure to a fellow school-mate who was allowed to return to school during the stage of desquamation, or, as she expressed it, "the girl who sat next to her was pulling the skin off her fingers."

In two or three instances where it appeared in a family of several children, their brothers and sisters, who slept in the same bed with the sick ones and were constantly about them, were allowed to go to school direct from the sick-room; and in a few instances I found that children were allowed to come and play with the little invalids.

These facts show *how* this most subtle poison is spread. The number of cases I saw where the children did not go to school, and of course could not contract the disease by exposure there, were not a few. Such cases must be attributed to the prevailing epidemic influence. This conclusion is far from satisfactory in clearing up our ignorance as to the origin of the disease.

That it is not always produced by contagion, I am fully satisfied. I think I have shown how it may be spread, and I am convinced that with proper precautions it may be greatly limited.

Doubtless, many children are sent to our public schools with the sole idea of getting rid of them, and how much greater would this desire be if there were sick ones at home to require the mother's extra care!

To convince such a class of any sanitary observances would be sheer nonsense, and we must rely upon such inquiries at school as will enable teachers to forbid their attendance. Unfortunately there is another source of infection, and perhaps of more danger, and that is where the medical attendant, ignoring all sanitary principles, fails to caution the family about isolating the patient, and as soon as he (the patient) can be up and about, he is allowed to be, and no disinfection of clothing is ever thought of. To this class, I think, we can look for but little help and a great deal of harm.

SUMMARY.

Appended is a tabular statement of the inspections, reinspections, etc, performed by me.

Tenement houses	772
Private dwellings	280
Stables	351
Privies and sewers	31
Stores and manufactories	67
Fat-rendering establishments	56
Public buildings	14
Piers and vessels in harbor	13
Cellars and basements	23
Streets and gutters	58
Sunken and vacant lots	4
	1,668

Contagious diseases—		
Small-pox	34	
Scarlatina	83	
Measles	10	
Varicella	5	
Relapsing fever	6	
Typhoid	6	
		144
Total		1,812
Vaccinations		443
The following complaints have been made:		
Tenement houses		99
Private dwellings		4
Stables		6
Privies and sewers		31
Factories and workshops		16
Fat-rendering establishments		3
Streets and gutters		58
Cellars and basements		3
Total		220

Respectfully submitted.

S. F. MORRIS, M.D.,
Health Inspector.

FOURTH SANITARY INSPECTION DISTRICT.

INSPECTOR L. DEMAINVILLE, M.D.

NEW YORK, March 11, 1871.

M. MORRIS, M.D.,

City Sanitary Inspector, Health Department of the City of New York:

SIR—I have the honor to submit the following report, containing the results of labor in the Fourth Sanitary District for the past year, commencing April 1, 1870, and ending April 1, 1871.

This district is bounded north by West Twenty-sixth street, south by West Fourteenth street, east by Sixth avenue, and west by North river, and comprises the Sixteenth Ward.

Tenement Population.—The tenement population of this district is mostly composed of the Irish class, other nationalities being comparatively few in numbers.

Streets.—The streets mostly requiring the attention of a health officer are Twenty-sixth, Twenty-fifth, Twenty-fourth, Nineteenth, Seventeenth, and Sixteenth streets, and all the avenues contained in the district, with the exception of Sixth avenue, which is generally kept in a good sanitary condition. This may be due to the fact that there are very few tenement houses on Sixth avenue, most of the buildings being composed of stores with private dwellings above them; these houses rarely containing

more than two or three families. Moreover, the people living on this avenue are intelligent, and belong to a better class than those living on the other avenues.

The other streets, such as Fourteenth, Fifteenth, Twentieth, Twenty-second, and Twenty-third streets, are almost entirely composed of first-class private dwellings; and it is only exceptionally that the inspector has to make a complaint against any of them—their sanitary condition being, as a general thing, of the best description.

Tenement Houses.—The sanitary condition of tenement houses has improved to such a degree that it is striking, and particularly gratifying to one who has been long enough on duty in the district to judge of the difference between its past and present conditions.

The ventilation in the majority of these houses is good, showing that the second section of the Tenement-house Act has been complied with.

Garbage, etc.—The throwing of garbage into the street-gutters will not be remedied effectively until some one on the premises is made responsible for the maintenance of its cleanliness and good sanitary condition.

Different plans for garbage boxes, etc., have hitherto been discussed, but it has been recognized that were even the best models adopted it would not remedy the evil. An intelligent housekeeper, made responsible for the good sanitary condition of the premises in general, is worth more than the best garbage boxes that may be invented.

Cellars and Basements, occupied as human habitations, are comparatively few in the district, the worst being on Tenth avenue, between Fifteenth and Eighteenth streets. Most of them have been converted into shops, and those still used as dwellings have been altered so as to conform as far as practicable with section 6 of the Tenement-house Act.

Street Cleaning.—The streets, some of which were in a very filthy condition, are much cleaner than usual.

Contagious Diseases.—During the period of time comprised in this report, small-pox and relapsing fever were the two leading contagious diseases requiring the action of the Board. The prevailing disease in this district for the present is scarlatina.

General Condition.—Finally, I will add that the condition of this district shows a marked and decided improvement in every respect.

SUMMARY.

Inspections and Reinspections.

Tenement houses	943
Private dwellings	98
Other dwellings	9
Cellars and basements	83
Public buildings	2
Stores and warehouses	2
Factories and workshops	2
Fat-rendering establishments	4
Stables	314
Privies and water-closets	69
Other nuisances	49
Complaints forwarded for the action of the Board	505

Contagious Diseases.

Typhoid fever,	number of	cases	5
Small-pox	"	"	171
Relapsing fever	"	"	51
Scarlatina	"	"	44
Measles	"	"	8
Number of persons vaccinated			145

Respectfully submitted.

L. DEMAINVILLE, M.D.,

Health Inspector.

FIFTH SANITARY INSPECTION DISTRICT.

ASSISTANT INSPECTOR SIMEON N. LEO, M.D.

DR. MORRAU MORRIS, *City Sanitary Inspector:*

SIR—I herewith present a report embodying the result of inspections during my service as Assistant Health Inspector since the first of July, 1870, up to the present period, in a district extending from Twenty-sixth to Forty-fifth street, between the Sixth avenue and North river (at one time reaching to Fifty-ninth street), and comprising the Twentieth and Twenty-second Wards.

The rapid growth of this portion of the city has necessitated many changes, and given rise to improvements that are highly appreciated by many who have experienced their benefits.

Character, Population, etc.—The district is notably marked by the strange admixture of character and peculiarities of its population, containing, as it does, a large proportion of tenement buildings, shanties, slaughter houses, fat-rendering establishments, stables, factories, many private dwellings, a number of stores employed for purposes of commerce, together with a tract of unoccupied new-made land on the river front, used at one time as a dumping ground for manure, etc.

Tenement Houses, together with the condition and health of their inmates, still continue to afford ample evidence of the happy results that are manifest in people who live in cleanly, well-kept, not overcrowded, and thoroughly ventilated apartments, as well as of the reverse in those few instances in which landlords and tenants failed to adopt these essential safeguards. It is worthy of comment, in this connection, that owners seem desirous of furthering, by every means, the efforts of the Board of Health, but it sometimes happens that the tenants themselves completely nullify the best provision made to secure their welfare by their own indifference and carelessness.

In this connection it seems proper to suggest that every house containing four or more families should have one of their number designated to look after the "sanitary" condition of the premises, and there is but little doubt that the additional cost or trouble which this might entail would be very soon more than compensated by the many advantages derived from it. The school water-closet plan of sink also presents many very desirable features for tenement-house purposes. There is, however, a most marked change for the better in this class of dwellings that augurs brightly for the future.

Shanties are rapidly disappearing under the steady and persistent efforts which are developing this section, substantial edifices now marking the site where once stood dilapidated sheds. Still all have not yet been removed, and some three square blocks, on Thirty-eighth, Thirty-ninth, Fortieth and Forty-first streets, furnish ample field for improvement, and afford the sanitarian a rich opportunity to cultivate and display the practical value of his science.

Contagious Diseases.—The recent outbreak of contagious diseases, such as measles, scarlatina, and small-pox, again admonishes all classes to profit by previous lessons. In tracing the origin and history of many of these cases, it is evident that public conveyances, such as cars and stages, sometimes the school-room, vessels used for transportation of passengers, and even the poor washwoman's basket with its clean clothing, often serve as a medium of communicating the most loathsome and distressing of diseases.

The sanitary regulations and instructions issued by order of the Board, have been distributed with care, and in every detail faithfully carried out. Removals to hospital, when necessary, have been made with caution, and every regard for the comfort of patients. The Disinfecting Corps are also deserving of mention for the prompt and efficient manner they have attended to the various cases in my district.

Slaughter-houses in my district have been submitted to careful and constant observation. They are numerous, and represent a most important and indispensable interest in our city. Fully sensible of the peculiar nature of their calling, the proprietors have in every instance expressed and evinced a desire to comply with any suggestion or improvement that might detract from the objections raised against them; and, as at present conducted, the slaughtering of cattle, hogs, etc., is divested of much that heretofore excited censure.

The Fat-melting Establishments on the west side, owing to the highly offensive odors which they gave forth, caused earnest complaint from many sources, and the Health Department took prompt and decisive measures to abate the evil. In this they have been successful, and the disgusting smell and impure atmosphere which rendered the district notorious and was fast deteriorating the value of surrounding property, has in a great measure disappeared. There are but a few obstinate cases which still defy authority. Improved machinery, with means of condensing, and various alterations in the conduct of the business, have assisted in the salutary change.

Cars.—Five prominent lines of "horse cars" pass through the section I inspect, and so conspicuous are certain facts connected with them bearing upon the public life and health, that I need not apologize for calling attention, at least, to—First, the want of guards on the front platform that shall prevent people from pushing others, or themselves jumping on or off while the car is in motion. Second, during the winter season the steps of these popular vehicles become unsafe, for which it might be well to recommend the adoption, in time, of some precautionary measure. Third, a substitution is needed for upholstered seats, which at times are filthy and alive with vermin; and, Fourth, means of improved ventilation should be provided for these vehicles.

Offal Boats.—The present system of gathering old fat, bones, etc., is certainly susceptible of improvement. The purchasing of refuse (in nearly every instance old and stale) causes many who have not the facilities or place to hoard up large quantities of highly offensive material. In warm weather this practice was a source of great annoy-

ance. The vessels which remove these collections might be furnished with inclosed receptacles that would hold their cargo. These should be thoroughly disinfected, and no vessel, when loaded, allowed to remain longer than a certain time at any city dock or landing place.

Streets, which were till recently paved with cobble-stones, are being replaced by smooth and level surfaces, easily kept clean, and in every respect vastly superior to the old system with all its defects. The recent heavy falls of snow somewhat retarded operations, and many of the thoroughfares, as a natural result, now show the want of attention.

Public Bathing-places.—The introduction of public bathing-places and baths, a want so long felt, has at last been supplied. At a certain time, with proper restrictions, they are thrown open, and the universal patronage received and the approval met with from every source, warrants the hope that our metropolis will ere long afford proper facilities *for all* who desire to observe that most essential of hygienic laws—"To keep cleansed."

SUMMARY.

The following shows the total number of inspections and reinspections, etc., made in the district between July, 1870, and April 1, 1871:

Public buildings		5
Factories, workshops, stores and warehouses		33
Fat-rendering establishments		42
Markets		3
Stables, one-half reinspection		817
Other buildings		244
Privies		76
Sunken and vacant lots		20
Tenements	425	
Reinspections of same	436	
		861
Gutters		84
Sloops, barges, and boats		10
Private dwellings		234
Cellars		8
Slaughter houses		39
Manure dumping grounds		13
Tanneries		6
Other nuisances		36
Violations of the Code		24

Contagious Diseases Visited, etc.

Cholera morbus	1	
Chicken pox	3	
Small-pox, 11, and varioloid, 39	50	
Measles	18	
Scarlatina	100	
Typhoid fever	14	
Yellow fever	2	
Relapsing fever	12	
		200

Number of houses visited on duty in vaccinating		168
Number of primary vaccinations made	67	
" secondary " "	377	
		444

Complaints made and found against the following:

Tenement houses	332
Stables	251
Gutters	28
Privies	89
Factories and workshops	15
Stores and warehouses	2
Gut cleaning	2
Public buildings	2
Cellars and basements	1
Other dwellings	5
Private dwellings	9
Tripe (picklers') establishments	7
Fat-rendering establishments	6
Sunken and vacant lots	9
Sloops, barges, and boats	5
Manure dumps	4
Tanneries	3
Violations of Code, and other nuisances	9
	772

Much time has been devoted in conjunction with my colleague, Doctor Edward Frankel, to the subject of adulteration in various articles of food, etc., and reports on the same duly prepared and handed in.

The sanitary reforms introduced in the district meet with general favor as well as a compliance and co-operation from citizens who seem anxious to aid the work in which the Health Department are engaged.

Respectfully submitted.

SIMEON N. LEO, M.D.

NEW YORK, March 10, 1871. *Ass't Health Inspector.*

SIXTH SANITARY INSPECTION DISTRICT.

INSPECTOR E. H. JANES, M.D.

NEW YORK, April 1, 1871.

To DR. MOREAU MORRIS, *City Sanitary Inspector:*

SIR—I have the honor to present the following report of my official labors in the Health Department during the year just closed.

Previous to the month of August, 1870, my district included the whole of the Twentieth Ward, and for a few weeks a portion of the Twenty-second Ward was added thereto. From August to December my duties were confined to that portion of the Twentieth Ward included between Twenty-sixth and Thirty-fifth streets, Assistant

Inspector Dr. S. N. Leo having been assigned to duty in the remaining portion of the Ward. From December to the present time my district has been that portion of the Twenty-second Ward situated south of Fifty-ninth street, and bounded by Fortieth and Fifty-ninth streets, Sixth avenue, and the Hudson river. My present report, therefore, must be a brief review of the labors performed in the two Wards, and the sanitary condition of each.

Street Pavements.—The topography, drainage, and general appearance of both districts have been fully described in previous reports, and it will suffice here to say that the spirit of improvement is gradually manifesting itself in the grading and paving of streets, the construction of sewers, the disappearance of many of the poorer class of dwellings, their places being occupied by structures of a more substantial and attractive character. Many of the streets have been repaved, the cobble-stone pavement being removed and trap-rock or wooden pavement substituted. The former material makes a very substantial pavement, easily cleaned, and, if well laid, conducive to good surface drainage; the latter makes a better road for travel, and if properly kyanized or otherwise preserved, answers every sanitary requirement. A serious objection to it is the temptation to fast driving, and the consequent danger to pedestrians and children, who, while crossing the streets and hearing no sound of the approaching vehicle, often run narrow risks of being run over or otherwise injured. The "tar poultice" pavement, which has been applied to some of the streets in the Twentieth Ward, is an unmitigated nuisance, in warm, dry weather sending forth clouds of dust which penetrate the smallest crevices around the windows and doors of dwelling houses, to the annoyance of the occupants, and to the serious detriment of carpets and furniture, and filling the eyes and air-passages of the passer-by, irritating these tender surfaces to an intolerable degree, while in wet weather the soft slippery mud formed on the surface renders the safe crossing of the street more ideal than real.

Street Cleaning.—The condition of the streets in regard to cleanliness has very much improved under the present administration. The organization of a street-cleaning bureau in the Health Department has proved a great auxiliary to the regular work of the department, and has given general satisfaction to the public. This is seen not only in the greater degree of regularity with which the streets are cleaned, but also in the promptness with which complaints are responded to and their causes removed.

Tenement Houses.—The requirements of the Tenement-house Act are, in a majority of instances, more readily complied with. Property-owners are becoming every year better educated to the importance of proper sanitary regulations, not only as contributing to the welfare of the occupants of their houses and thus discharging an important public duty, but as a matter of pecuniary interest to themselves by securing good tenants and prompt payments. No better proof of the good results of the tenement-house inspection and the consequent improvement can be given than the fact of the steady decrease in the rate of tenement-house mortality during the last three years as obtained from the Bureau of Vital Statistics. The figures there show that since the enforcement of the tenement-house law was commenced, the death-rate has gradually diminished, which fact alone is sufficient to demonstrate the wisdom and efficiency of the present system of health government.

General Nuisances.—The orders of the Board for their abatement have been responded

to more readily than formerly, showing a marked contrast between that obstinate resistance that was manifested during the first year of the administration of the Metropolitan Board of Health and the present plan of operations matured by time and experience.

Rendering, Fat, and Melting Establishments.—The removal from Thirty-eighth street of the works of the New York Rendering Company and the various fat-melting and gut-cleaning establishments of that neighborhood, procured for the public during a portion of the last season a temporary relief from the offensive odors that had for years impregnated the atmosphere to an extent almost unendurable. I regret to say, however, that the work of fat-melting has been resumed, and that our citizens are again daily annoyed with this intolerable nuisance.

Stables.—The condition of stables, with perhaps a few instances of improvement, is about the same as was the case last year. Several improvements have been made among the smaller establishments, such as manure vaults where they have been recommended, and sewer connections where they have been necessary, in order to secure proper drainage. But the ammoniacal exhalations arising from large stables are very annoying and offensive, and I believe that nothing short of a regular and daily use of the proper disinfectants will remedy the evil.

Privies, particularly those belonging to tenement houses, continue to be a great nuisance. Building the privy vault with brick and cement, and connecting it with the street sewer, will, to a certain extent, relieve some very objectionable features; but in many instances, perhaps in a majority, the sewer connection is so made that it fails to carry off the contents of the vault, leaving a large accumulation to be agitated by every shower of rain, causing it to throw off suffocating volumes of foul gases, to the great annoyance of the public, detrimental alike to comfort and health. I have repeatedly stated my objections to this mode of constructing privy vaults, and as often recommended what I believe, with proper care, would prove an excellent substitute, viz.: the school-sink. So long, however, as we have the present style of privies, a system of frequent and thorough disinfecting is necessary in order to render them even comparatively free from offensive odors.

Slaughtering.—The business of slaughtering has been discontinued in the Twentieth Ward, and the citizens of that ward are not now annoyed either by the driving of cattle through the streets, or the noise and offensive emanations arising from the yarded animals and slaughter-houses. A few cows are kept for their milk, mostly west of Tenth avenue, the stables and yards being generally well constructed, graded, and drained, and the animals fed on hay and grain; no swill is used, so far as I can ascertain.

Factories, etc.—In my present district there are several iron-works, machine-shops, factories, and other establishments, in which furnaces are employed in the working of engines by steam, the smoke from which has for a long time been the cause for serious complaint. In obedience to section 110 of the Sanitary Code, many of these furnaces have been so altered as to partially consume the smoke, and thus in a great measure abate the nuisance. There still remains, however, much to be done in this direction.

Small-pox and *relapsing fever* have prevailed to a considerable extent during the year. These cases have generally been removed to their respective hospitals for treatment, or so isolated at home as to be considered not dangerous to the public health. The latter disease has been particularly prevalent in Twenty-sixth and Twenty-eighth streets, west

of Tenth avenue, and among the shanty population on Fortieth and Forty-first streets. Whenever cases of this fever have been reported, the premises have been visited with as little delay as possible, and the patient, if thought advisable, removed, after which the premises are cleaned and disinfected. It has been notably observed by many, that the use of carbolic acid as a disinfectant in cases of scarlet fever, seems to exert a modifying influence upon the sick patient. In cases of small-pox the same course has been pursued, and vaccination offered to all who had been or were likely to be exposed to the disease.

The general health of the district has been good during the year. Considering the extreme heat of the summer and the large number of persons exposed to its influence, we must confess that the rate of sickness and mortality has been remarkably low.

SUMMARY.

The following is a statement of the inspections and reinspections made during the year:

Tenement houses	1,460
Private dwellings	360
Stables	550
Privies not included in the above inspections	45
Basements not included in the above inspections	94
Factories and workshops	61
Fat-melting establishments, including lard	58
Shanties	140
Vacant lots	30
Docks	8
Slaughter-houses	23
Tripe cleaning	12
Miscellaneous	100
Small-pox cases	85
Relapsing fever	42
Typhus and typhoid fever	8
Scarlatina	27
Vaccinations performed	200

The following complaints have been forwarded to the Board, and the several required improvements made:

Tenement-houses	143
Private dwellings	40
Privies	41
Stables	28
Fat-melting	17
Gutters	10
Tannery	1
Engine house	1
Basements not in T. H. complaints	8
Streets	13

Dock	1
Workshops	5
Yard and hydrants	12
Market places	1
Vacant lots	6
Wash house	1
Sewer	4
Slaughter house	1
School building	1
Violation of Code	8

All of which is respectfully submitted.

E. A. JANES, M.D.,
Health Inspector.

SEVENTH SANITARY INSPECTION DISTRICT.

ASSISTANT INSPECTOR CORNELIUS M. O'LEARY, M.D.

NEW YORK, December 1, 1870.

To DOCTOR MORRIS, *City Sanitary Inspector:*

SIR—I have the honor herewith to transmit to you a report of the labors performed by me as Assistant Health Inspector to the Board of Health Department, from July 1 to December 1, 1870.

Topographical and Geological Characteristics.—The district to which I have been assigned is bounded on the south by Fifty-ninth street, on the west by Hudson river, on the east by Sixth avenue and Harlem river, and on the north by Spuyten Duyvil creek. The short time that has elapsed since my appointment to the sanitary inspection of this extended district, precludes the return of a report which would place the Board of Health in possession of all the facts connected not only with the sanitary condition and wants of the built-up portion of the district, but with the geological and topographical influences operating favorably or injuriously on the salubrity of tracts not yet reclaimed from rural wildness. For I deem it of no less moment to ascertain the peculiar rock structure, soil growth, range, and water-shed of localities not yet numbered among the busy haunts of men, but which will speedily rival the oldest portions of the city in density of population, and will be the chosen site of elegant villas, than to bring whole rows of tenement-houses within the operation of the sanitary code. The most serious obstacles thus far met by the Board of Health, in its persistent efforts to raise the public health to the highest standard, have been found in the neglect of precautionary measures before certain streets were built. This is especially true of those streets which were laid out without any regard to the direction of the natural water courses. I make this remark in order that due weight may be attached to such suggestions as I shall hereafter offer, in reference to the sanitary improvement of localities not yet subjected to the questionable process of being cut through at intersecting right angles, by streets which are levelled or filled up to a uniform grade, with total indifference to the origin and course

of natural water conduits. To simplify my task I will divide the subject I have to deal with, as follows:

The surface of the district is extremely varied, representing greater differences of altitude and depression than the entire rest of the island. There is a gradual rise of land along the Hudson, from Fifty-ninth street to Stryker's bay, where occurs a break in the shape of an amphitheatre, extending a distance of seven or eight blocks, when the rise again takes place, and continues gradually to One Hundred and Twenty-fourth street. Here we meet that remarkable depression, no doubt the whilom bed of a tributary to the Hudson, which is known as the valley of Manhattanville. The original width of this vale has been increased by the removal of immense quantities of sand, both for ordinary building purposes, and the construction of the Hudson River Railroad. The elevation recurs at about One Hundred and Thirty-fifth street, and continues with but few and trifling variations till Washington Heights are reached, when, for a distance of two miles, a series of magnificent bluffs overlook the river, and rival, in all that makes building sites desirable, the famed banks of the Rhine. The thinly populated region at the extremity of the island slopes gradually to Kingsbridge and Spuyten Duyvil creek. Though in describing the natural configuration of the district surface I have confined myself to the river bank, a similar succession of fluctuations in rise and fall as far east as Ninth avenue is included. East of the Ninth avenue, below One Hundred and Tenth street, the same outline prevails as far east as the Central Park, the graceful slopes and curvatures of which I need not here describe, for instead of being a source of solicitude to the inspector, it is not alone his strongest adjutant in sanitary reform, but supplies in its manifold beauties a moral element which reaches the most uncultured, and without which we would in vain endeavor to inculcate a hygienic sentiment among the poorer classes. North of One Hundred and Tenth street, and east of Ninth avenue, the entire surface is level. Gneiss and granite are the chief rock strata, which, owing to their extreme hardness, absorb very little moisture, but abound in springs that flow into and saturate the adjacent soil. This water is the prolific source of malarial diseases, for it frequently finds its way into pent-up valleys where, stagnating, it fills the air with miasma. The eastern portion of the district, being farther removed from the watershed of the rocks, is much drier and sandier, and enjoys a proportionate immunity from intermittent fever.

Swamps and Sunken Lots.—The experience of the past summer has proved that no greater nuisance exists in the district than swamp lands and sunken lots. The extreme dryness of the season, coupled with the unusual heats, seems to have distilled out of these pest-places a more rancorous exhalation than in former years, for the character of this summer's malarial disease was exceedingly violent, approaching often to the typhoid type. The swamps for the most part lie along the base of the rock range above described, owing to the accumulation of water from the slopes. Thus we find ponds ten to fifteen feet in depth on the line of Ninth avenue, from One Hundred and Twenty-second to One Hundred and Twenty-fifth streets, as we have here a point of convergence for all the water flowing from the rocky heights on which are situated Leake & Watts' Orphan and Bloomingdale Lunatic Asylums. The unsanitary influence of these swamps cannot be overestimated, for they taint not only the immediate air of the neighborhood, but so fruitful are they of poison that every blast passing over them

bears a burden of infection to distant points. Again, from One Hundred and Thirty-eighth street, between Eighth and Ninth avenues, to One Hundred and Forty-ninth street, we have the same source of miasmatic poison aggravated by the continued lodgment of water, for there is neither natural nor artificial drainage here, the tide often surging to the land level.

The sunken lots are scattered throughout the district, and the pleasant glebe of to-day may be encircled to-morrow by unsightly walls of earth, sand, and stone, impassable barriers to the escape of the surface water. The grand Boulevard from Sixty-second street to Eighty-sixth street has wrought this unpleasant change more than any other artificial cause, and contributed not a little to the prevalence of fever and ague in Bloomingdale, a locality hitherto comparatively exempt from the ravages of that unwelcome visitant. The neglect of building culverts where the road passes over natural water courses has had much to do with this trouble, and even where culverts have been built their construction is so faulty that they have become comparatively useless. This is the case at One Hundred and Tenth street, where the arch over a stream was built so low that the channel speedily clogged, and the greatest inconvenience is now felt from the reflux of the water and sewage. The same trouble exists on the line of Eighth avenue and Seventy-sixth street. The latter street was built across a swamp, which inclined northward, and no allowance having been made for this circumstance, the water accumulated on the south side, and all through the summer an immense pond, covered with a green film, constantly exhaled its paludal poison. If provision had here been made for a capacious culvert this nuisance might have been obviated, for the swamp, as it previously existed, would not have proved harmful in a thinly populated locality. But the greatest evil from sunken lots experienced during the past summer was along the Eighth avenue, on both sides, from One Hundred and Thirty-ninth to One Hundred and Forty-fifth streets. Here the ruins of old fish-ponds, irregular depressions or "dips" in the land, and lots below the level of the filled-up streets, have held all through the summer a nasty compound of decaying vegetable matter and animal refuse, which the tenants of the neighboring shanties and second-class tenement-houses cast into them. Every evening the air is heavy with malaria, and, if the theory of Herbert Spencer, in regard to the nature of malarial poison, be correct, the thick and vaporous clouds which hang over those fens at night indicate an active generation of paludal sporules. At least no theory is needed to account for the results, for it is undeniable that the worst type of intermittent fever has prevailed all summer in the neighborhood. It must, however, be admitted that the careless and imprudent habits of those who suffered most had much to do with the severity of the disease, while those who exercised ordinary precaution suffered comparatively little. Now, it may be asked, why did such a state of things continue throughout the season without measures being taken for the abatement of this nuisance? My reply is that there existed but two apparent remedies, neither of which was very available. One consisted in filling up to the proper level all sunken lots, ponds, and swamps; but, apart from the questionable advantage to be derived from a proceeding which would not much more than hide from view the peccant matter, the rule of the Board, requiring the inspector to find out the name and residence of the owner, and to make complaint accordingly, rendered this remedial plan at once impossible, for not only

is it difficult to ascertain the names and residences, but there is nothing easier for owners than to disavow proprietorship, and a deadlock ensues thereupon.

Though I have frequently through the summer consulted the books in the Tax Commissioner's office, and ascertained the names of those who paid taxes on certain properties, when I spoke to them they at once disclaimed ownership, saying either that they had sold out or had never owned the property in question. I would therefore suggest that where such difficulties occur the Board empower the attorney to act on an Inspector's complaint, without reference to the name and residence of the owner, and levy on the property for improvements made. The other remedy is drainage, and this brings me to the consideration of this important sanitary necessity, as it exists throughout the district.

. *Drainage* —Defective drainage is the root of all the unsanitary influences which curse the upper end of the island. So uneven is the surface of the land, that while the heights are drained the gain is obtained at the expense of the low lands, and so walled in are these in certain places by beetling granite bowlders that the building of a sewer becomes an engineering problem; and in other places the land level approaches so near the tide water level that the question of sewering becomes a still more insoluble enigma. It seems a radical error was committed when the Boulevards were run through unsewered streets without the previous construction at least of sections of sewers which might have been afterwards continued through to the river, without the necessity of disturbing those elegant roadways. This is notably the case on the line of One Hundred and Tenth street, east of the Boulevard, where, if a section of sewer corresponding to the width of the road had first been built, it would have been easy to build a much needed sewer from Tenth avenue to the Hudson river. As it is, there can be no relief for the streets east of the Boulevard till a main trunk is built along the Boulevard itself with which these streets may connect. The same difficulty will be experienced when the streets about to intersect Sixth and Seventh avenues shall have been cut through. Within the last six months a sewer was built along Eighth avenue, from Fifty-ninth street to Eighty-fourth street, but it has not proved of much relief to the swamps and sunken lots on the west side, for they are below the level of sewer connection. The sunken lots on Eighth avenue, from Sixty-second to Sixty-sixth streets, are in a deplorable condition for this reason, and though I have endeavored by repeated complaints against reputed owners to have them filled to the proper level for connecting with the Eighth avenue main, I failed in every instance, through the refusal of such owners to receive service notices. The sunken lots on Eighth avenue, between One Hundred and Thirty-ninth and One Hundred and Forty-fifth streets, are nearly all below the tide-water level, and, though the necessity for draining them is imperative, the question of how it is to be done is equally difficult. Indeed, I see no more feasible plan than to adopt the deep drainage system of London, by building a deep and spacious sewer under Eighth avenue as far as the northern terminus, where a steam pump might be constantly at work throwing the sewage into the river as fast as it accumulated. The plan would certainly afford the much needed relief, while its practicability is fully attested by its successful operation in London. In view of the manifold evils arising from the laying out of streets, without regard to the flow of natural water-courses and without making provision for draining the adjoining lots, I would suggest that henceforth, by a mutual

understanding between the Departments of the Board of Health and of Public Works, no contract be given out for the opening of public streets till it is first determined what measures should be taken for insuring an effective drainage. This is the more necessary, owing to the peculiar configuration of the upper end of the island, since without the adoption of some such precautionary means the possibility of laying down sewers subsequently would be materially diminished. Perhaps there is no street in the district more sadly in need of a sewer than Lawrence street along its whole length. The street festers with animal and vegetable refuse, and the muck which prevails there in wet weather emits a sickening odor. I have, with the concurrence of a few property owners, petitioned for the construction of a suitable sewer, after which the street should be paved. Here I cannot but extol the readiness with which the Department of Public Works co-operates with the Inspector, especially in promising to build sewers without the consent of the property owners, but merely on the ground that they are required by considerations of public health.

Tenements.—Though I have visited two hundred and sixty-three tenement-houses, I found their condition in general so good that I had but eight complaints, and these were based on trivial violations of the Tenement-house Act. A reinspection showed that on the order being served, the terms of the law were immediately complied with. The privies attached not only to tenement-houses but to shanties and middle-class dwellings, were more frequently found fault with, as the absence of Croton water or the want of sewers in the streets did not allow of water-closets, and the vaults substituted therefor were often allowed to overflow. Landlords, however, were always ready to make the required improvements, and thus many privies were cleansed and disinfected against which I had no necessity for entering a complaint.

Shanties.—This is the district *par excellence* for shanties, there being no less than 550 in the square bounded by Sixty-third street, Eighth avenue, Eighty-second street, and Ninth avenue. It is impossible to apply the rules of the Board to these primitive dwellings, and the most I have been able to do was to instruct the occupants how they might conform to the general laws of health. Of course, wherever I discovered flagrant violations of the law, I either had the shanties pulled down or ordered such changes to be made as would render them habitable.

Stables and Cow Sheds.—The keeping of pigs and cows in miserable sheds attached to the shanties is another source of unhealthiness which I had to contend against strenuously, for our shanty population regard with special affection both these domestic animals, and the pig, above all, is the pet of the family. The owners, therefore, resort to every subterfuge to blindfold the Inspector, and even where the animals have been removed by order of the Board, they somehow find their way back again and resume their Sybarite habits of life on swill and garbage. Where, however, I found it possible to indorse permits for keeping cows and swine without danger to the health of the neighborhood, I did so that the people might learn that the rules of the Board are meant as no infringement on individual rights, but intended to guarantee to them the greatest temporal boon, viz.: good health and immunity from causes which endanger it. It requires constant vigilance on the Inspector's part to see that cows and swine are properly kept, and that when once removed by order of the Board, they are not brought back. With very few exceptions, I found the shanty inhabitants quite ready to receive such instructions as the Inspector

saw fit to give, and I found on revisiting that those instructions were nearly always faithfully complied with.

There are many public institutions in the district, in the majority of which I found defective drainage, owing to the want of sewers in the neighboring streets, and in a few the evils of overcrowding. I now respectfully submit this report with the following:

SUMMARY.

INSPECTIONS.		COMPLAINTS FORWARDED.	
Tenements	561	Special complaints	4
Cellars and basements	89	Open drains	5
Other dwellings	154	Privies	31
Fat-rendering establishments	5	Cellars and basements	7
Public buildings	24	Tenements	11
Stables	778	Stables	40
Sunken lots	177	Sunken lots	87
Privies	286	Other dwellings	2
Private dwellings	53	Private dwellings	6
Other nuisances	10	Gutters and streets	4
Reports on applications for permits	68		

CONTAGIOUS DISEASES.

Relapsing fever	31
Typhoid fever	125
Small-pox	20
Varicella	2
Scarlatina	7
	185

Respectfully submitted.

C. M. O'LEARY, M.D.,
Ass't Health Inspector.

EIGHTH SANITARY INSPECTION DISTRICT.

INSPECTOR HENRY R. STILES, M.D.

NEW YORK, November 30, 1870.

MOREAU MORRIS, M.D., *City Sanitary Inspector:*

SIR—The *Eighth Sanitary District*, to which I was assigned June 1, 1870, is bounded on the north by Canal street, the Bowery, and Catharine street; on the east, by the East river; on the west, by Broadway; and on the south, by Fulton street, and comprises the Fourth, Sixth, and a portion of the Second Wards.

Topography.—Its surface still presents much of the unevenness which originally characterized it in Manhattan's earlier days, when the area now covered by the City Hall Park was a meadow, when "Beekman's Swamp" and "The Collect" pond drained the

greater portion of these three Wards, while from the North to the East river, across the breadth of the island, swept a broad tract of low marsh, nearly in the line of the present Canal street. The streets, also, of this entire portion of the city, bear unmistakable evidence of their "Knickerbocker" origin, when street lines were determined by accident or whim, and roads followed the meanderings of a cow-path. Narrow and crooked many of them are, while out of them open numerous little alleys and "cul-de-sacs," in which our Dutch predecessors seem greatly to have delighted. A large portion of this district, also—perhaps a sixth of its area—along the river front, is entirely "made land," rescued from the tide, which unceasingly protests against the theft with its every ebb and flow, by filling the cellars and interfering with the sewage of this locality.

Character of Occupation, etc.—The Eighth District is largely occupied by buildings devoted to mercantile and manufacturing purposes. A portion of its river-front; a strip along its southern border, say between Spruce and Ferry and Fulton streets; another strip along its western border, from Broadway to Centre street, are portions which teem with human life and activity by day, and are deserted at night, and their sanitary condition does not present much cause for complaint. Another section, included mostly between Spruce, Chatham, New Bowery, and Catharine streets, is also partially devoted to business purposes, yet pretty well interspersed with tenement dwellings, and with a few houses, each occupied by two or three families in moderate circumstances. The balance of the district is a perfect "slough of despond" to the sanitarian, comprising the thickly populated tenement-house and sailors' lodging-house sections, traversed by Park street, City Hall place, Baxter, Bayard, Roosevelt, James, Oliver, Cherry, Oak, and portions of Mott, Mulberry, Elizabeth, Henry, and Madison streets.

Tenements.—The greater proportion of buildings in this district, now occupied as tenement houses, were originally private residences; and it is the perfect impossibility of properly adapting this class of edifices to their present uses, which renders them decidedly the worst class of tenements to deal with and keep in good order. They are, in many cases, no better than a congeries of old rat-holes, which defy all attempt at improvement, and which invite immediate demolition—even, if it be necessary, at the hands of public authority. The tenement houses, built especially as such, were mostly erected before the creation of the Metropolitan Health Law, and are, consequently, not to be accepted as *models* of such houses; still they can be, measurably, brought within the wholesome limitations of that law. I say "measurably," for there are some signal exceptions, such as "*Gotham court*," in Cherry street; "*Murderer's alley*" (as I believe it is called), between 474 Pearl street and 12½ Baxter street; "*Bottle alley*," in Baxter street; Donovan's lane, the "Limerick" and "Kerry" yards, and others in Bayard, Oak, and Mulberry streets, which deserve "total annihilation" quite as promptly as those to which I have already referred.

Changes in Character and Occupation, etc.—There is a slow but steady improvement going on in the character of my district, caused by the steady pressure of business against these strongholds of tenement-house population. The opening of wide, well-graded, and paved streets, such as Worth, New Bowery, and New Chambers streets, has not only let in fresh air and sunlight, but from these new main arteries of trade smaller channels of business are creeping up the side streets, *anastomosing*, so to speak, with

other streets beyond, and occupying the ground with a grasp that will never again be relaxed. Buildings, which were set down in last year's sanitary survey as tenements, are now found to be occupied by small manufacturers of shoes, clothing, etc., and with these changes in the character of occupation of these old rookeries will follow new buildings, erected solely for business purposes. Thus, by degrees, this miserable class of our fellow-citizens will be forced either into the better tenement districts of the upper part of the city, or into the freer air and roomier accommodations of our adjoining cities or suburban towns. But few new tenement houses are being erected within this district, and those few are being constructed with regard to the requirements of the Tenement-house Law.

Population, its Character, etc.—The largest proportion of the resident population of the district is Irish, and the next largest is German, or rather a foreign element of mixed and mongrel Continental races, occupying, more particularly, the neighborhood of the river front—James, Oliver, Roosevelt, Chatham, New Bowery, Baxter, Bayard, and Mott streets. In one large tenement in Roosevelt street I found quite a colony of Chinese, whose personal habits, as evidenced by the appearance of themselves and rooms, as well as by the cheerful testimony of their landlord (himself an Irishman), were far superior to that of their Irish neighbors.

Stables.—Stables in my district are generally unmitigated nuisances, located in rear of, or at the side of tumble-down tenements, approached through narrow, badly-paved, and generally unsewered alleys—in some cases through the house-hallway—unfurnished with manure vaults, and filthy with drainage and manure. Yet I honestly think that much of the trouble arising from accumulations of manure in stable yards is attributable to the difficulty experienced in getting it promptly and regularly removed by the contractors.

Ash and Garbage Nuisances.—It is very much in the same category with the much vexed question of the disposition of ashes and garbage, to which sanitary experience seems, as yet, to have furnished no practical solution. In regard to this class of nuisances, it seems a great deal easier for the Boards of Health and Police to direct what tenants shall not do, than to suggest what they shall do. Put a family into a space of 10×10 feet, in a back room at the top of a five-story rear tenement-house, and the problems of domestic life, considered with relation to health and comfort, become infinitely more perplexing, both to them and to the public guardians of their health, than they ever could become if the same family occupied a house by themselves with plenty of air, light, and room.

Pavements.—My district comprises some of the worst cobble-stone pavements which were ever inflicted upon a city; and the worst paved streets are invariably those where the worst class of population is to be found. No population can maintain its self-respect in the face of foul, noisome streets, and no streets can by any amount of human ingenuity be kept properly cleaned unless decently paved, graded, and curbed; and where the streets are not properly paved and cleaned, a decent class of buildings cannot be expected. The few streets in my district (such as New Bowery, Beekman, New Chambers, Canal, and a portion of Worth street) which have been furnished with improved pavements, present a striking difference to the rest, not only in their greater cleanliness (and facility of being kept cleaned), but in the better class of buildings which they

naturally invite. I am convinced that if the Department of Public Works would take in hand the proper grading and paving of the Fourth and Sixth Wards, they would furnish the very foundation-stone for the moral, social, and commercial regeneration of that section, by affording a basis upon which the architect and the sanitarian could successfully and hopefully labor—the one to improve its material value, the other to elevate the condition of its inhabitants. Religion and philanthropy and sanitary science have wonderfully altered the complexion of this "Five Points District" since the "Old Brewery" days, but it seems to me that the civil engineer, driving his lines remorselessly through these crooked and narrow streets, under the supervision of a wise and far-sighted public authority, would rid our noble city of its foulest blot, and add millions to the taxable value of its property.

In connection with this subject, I may add that the long delay in the grading and paving of the extension of Worth street, between Baxter and Chatham streets, gives rise to nuisances seriously affecting the public health and comfort, and which have been the subject of repeated complaints both by myself and other inspectors. It also defeats the facility of travel. etc., which must have been the original intention of the extension, and retards the improvement of property in that neighborhood, which had evidently received an impulse from the proposed extension.

Public Buildings.—I have within my district nearly all the public or municipal buildings of the city, viz.: the City Hall, Court House, and other edifices in the City Hall Park; "The Tombs," or Hall of Justice; the Arsenal, etc., all of which, thanks to the energy of the Department of Public Works, are beginning to assume that character of tasteful adornment and completeness which becomes the dignity of a great city.

Markets.—I have also within my district two markets, viz., the Fulton Market and the Fish Market, both of which are abominable nuisances. The Fulton Market, especially, is a daily offence to the thousands of our citizens who have occasion to pass and repass it on their way to the ferry, and more than justifies the description given of it in 1865,* as "situated on made land, with defective ground and surface drainage; the buildings are old wooden structures in a dilapidated condition; the stalls are small, poorly ventilated, and offensive with the refuse accumulated in and under the worn-out floors; the gutters in and around the market are generally obstructed with filth; in a word, the whole establishment, in its internal arrangements and condition and in its external appearance and surroundings, *is a disgrace to a civilized community.*" Words, indeed, are totally inadequate to describe this place, which is daily becoming more crowded and filthy.

The Fish Market.—The New Fish Market opposite, although a pretentious edifice, is by no means such a model market as it might be. Its sewage flows into a dock instead of being carried out to the outer pier line where the current of the river might wash it away; and it may be doubted whether the fish, which are kept in floating crates in this same noisome dock (where boys bathe by wholesale, and a residuum of filth always lingers), may properly be called *fresh* fish, or *healthy food.* Its street drainage is also defective, so that the street in front is constantly overflowed with filthy puddles of dirty water, apparently unprovided with any means of escape. And thus the peculiarly

* Report of Council of Hygiene of Citizens' Association on sanitary condition of New York.

offensive odors of fish in every stage of decomposition are maintained, day and night, close under the nostrils of the passers-by in this densely thronged thoroughfare.

Sewers.—My district is very thoroughly sewered, and the sewers are mostly in fair condition. A new sewer has been laid through Oak street within the past month; and here and there, during the past year, sewerage facilities have been afforded, on application of owners, to several localities. The most defective sewerage in my district is along the water-side.

Proposed Improvements of Docks and Piers.—In the able and comprehensive Plans for a New System of Piers and Docks, lately presented to the Department of Docks (and now under consideration by that Bureau) by General Viele, will be found some admirable provisions for overcoming the present difficulties of water-side sewerage, as well as for the proper location, ventilation, and sewerage of our great public markets—provisions which, if carried into effect, will render the city of New York, with its unrivalled water-front, the healthiest as well as the grandest commercial city of the world.

Street Cleaning.—I may, perhaps, also be allowed to express my satisfaction at the thoroughness with which, during the past remarkably hot summer, the streets of my district have been cleaned, several of them daily—and to this I cannot but attribute much of the comparative healthfulness which this portion of the city enjoyed, despite the great heat which prevailed. In this harmonious concert of action between the Street Cleaning and Health Departments, as in other cases, we have seen one of the good results which may be expected from the present consolidation of different public departments under one municipal authority.

Contagious Diseases.—The principal contagious diseases in my district, since I assumed charge of it, have been relapsing and typhoid fevers—prevailing mostly in Oak, Pearl, Baxter, Mott, Mulberry, James, Roosevelt, and Water streets—localities which, for years past, despite all that sanitary care has been able to do for their improvement, have been the recognized starting-points or centres of the various epidemics which have visited our city. Removal and disinfection have been promptly carried into effect, and there seems to be little or none of these diseases lingering in these neighborhoods.

Disposition of People towards the Board—I have found, in my daily walks among these localities, the greatest good-nature and rough courtesy exhibited towards me as a representative of the Health Department, whose beneficent operations seem to be appreciated by the unfortunate inhabitants of the rookeries and slums. It is true that I sometimes get a sly but good-natured "insinuation" that "the Boord ov Health" does not accomplish all that might be expected of it, but still it is evident that we are considered as friends.

First and Second Wards.—On the 3d of December, 1870, my district was somewhat changed, the Sixth Ward being assigned to another Inspector, and the balance of the Second, with the eastern half of the First, given to me, in connection with the Fourth, which I previously had. The boundaries of my present field of labor are Broadway, Chatham, and Catharine streets, and the East river.

Public Needs.—This portion of my district presents certain conditions which have a very decided bearing upon the healthfulness of our city, and which claim the attention not only of the Health Board, but of the several other departments of the city government. The public health, no less than public opinion, demands from the Department of

Public Works a system of sewerage which shall best overcome difficulties attendant upon tidal action, and the most approved pavements in those streets through which daily surges the commerce of a continent; from the Street-cleaning Bureau the systematic cleaning of streets, lanes, etc.; from the Commissioners of Docks and Piers, the removal of the rotten wooden cribs which fringe our noble water-front, entangling and detaining the floating filth which would otherwise be swept out to sea; and from the Commissioners of the Sinking Fund, the abolition of those "festering sores" which our city has inherited from its progenitors—the public markets.

Sanitary Defects of Construction of Business Buildings.—In regard to the sanitary conditions of the business buildings of this section of the city, while admitting that there is a very noticeable improvement in their comforts and construction, yet I am convinced that the health of a very large number of our business men is being undermined, slowly but surely, by defects of ventilation, heating, light, and especially by the use of underground and basement offices, particularly in those buildings which are constructed of iron and stone. The chill which constantly pervades these apartments is very perceptible to one who enters them from the outer air; the slightest perspiration is checked, and in this way, as well as from long confinement during business hours, the foundation is insensibly laid for neuralgias, congestions, etc., which sap the fountains of vitality. I am convinced that, could the health history of each individual occupant of these buildings be carefully traced through a series of years, the mass of evidence would be curiously illustrative of the wide prevalence of what may be called the architectural causes of disease. It is a class of causes with which, as a Board, we cannot, at present, deal directly or effectively, yet it is no less our duty to awaken public attention, mould public opinion, and direct public intelligence in regard to it, confidently awaiting that "millennial period" when our architects shall be able to harmonize the purest principles of their beautiful art, in the construction both of our homes, our offices, and our places of public resort, with all the conveniences and comforts essential to the due prolongation and enjoyment of life and health.

Streets and Street-cleaning.—In the Fourth Ward contagious disease has prevailed to a less degree than might have been expected from the character and surroundings of its population, and especially from the neglected and abominably filthy condition of its streets during the past winter.

Demolition of Unsafe Buildings.—I am rejoiced to chronicle the fact that in my district, as in other portions of the city, the Department of Buildings has done good service to the public health by demolishing certain old and unsafe tenement-houses and rookeries, which have for years been "plague-spots," always dangerous to life, limb, and health, and often complained of by our inspectors, yet apparently irremediable under our powers. It is in the power of the Department above-named to accomplish an immense sanitary reform, supplemental to legitimate action of our own Board.

Gotham Court.—In the month of January of this present year, I had the honor to submit to you a special report upon "Gotham Court" (Nos. 36 and 38 Cherry street), accompanied by some suggestions, the substance of which I take the liberty of incorporating in this report. "Gotham Court" is already familiar to you and to the public as a gigantic specimen of the "packing-box tenement-house," and its beauties (?) and peculiarities of structure, ventilation, sewerage, etc., have been so often described and

illustrated (in Report of the Council of Hygiene of the Citizens' Association, 1866, pages lxxx., 49-55; in the several Reports of the Metropolitan Board of Health, 1868-69; and from time to time in the daily and pictorial papers of the city), as to demand no further explanation from me.

Suffice it to say that the two "barrack" buildings on the "court" furnish tenements (two rooms each) for 146 families, or (averaging 4 persons only to a family) 584 individuals,* and has, at times, been packed with nearly double that number. The following *un*-sanitary conditions exist in these buildings: (1) The *roof* is a general (and by no means safe) playground for children, and a *place of deposit for ashes, garbage*, and to a large extent *is used as a privy* by the tenants, whom I cannot blame for preferring it to the foul, dark, and dangerous underground privies, of which more anon. (2) The plaster and wood-work of the hall-ways is out of repair and filthy; and the rickety *stairs leading down into the cellars* are entirely unprovided with hand-rails, and the steps being narrow, thick with mud and filth of every kind, and unlighted, *are*, in fact, *dangerous;* the general condition of the lower halls being also extremely filthy. (3) The *cellars* are *dark, horribly foul, and filled with mud, rubbish, and human excrement.* They are not used, as intended, for storage of wood and coal, for such property is not safe from depredation there, and because, also, human life is not safe in these cellars (owing to the rowdyism which is rampant around this court), and on account of the dark and filthy access thereto. But few coal and wood bins remain in the cellars, having, probably, been broken up for fire-wood. In one or two that were left, I found evidences of their having been used as sleeping places, or for more nefarious purposes. (4) *The privies* (which open into and are reached through these cellars) are horrible breeding tanks of disease, and have been too frequently described to need any new sketch. The seats and wood-work have been broken down, and in some places have entirely disappeared. An open ditch or drain extends the whole length of the court (234 feet), filled with rubbish, excrement, and indescribable filth. Water is allowed to run through this trench twice a day (it is said); if so, it certainly does little good. The horrible odors from this immense subterranean *cloaca* have no vent except through the small iron gratings in the pavement of the yard of the court overhead, and through the cellars and up the stair-ways, and thus through the entire house. It must be remembered, also, that after it reaches the open air of the yard, *the odor rises up between the two piles of buildings* (each five stories high), *which are separated only by a distance of nine feet wide. The poison thus concentrated is very directly applied to each and every apartment in the buildings*, and there is no escape from it, because, from the peculiar back-to-back construction of the tenements, not a single room has any through-and-through ventilation. Added to the actual filth of the privies, is that arising from the court-yard itself, into which much rubbish and garbage is thrown by the tenants, who will not go into the filthy cellars, and who throw much of their refuse (of *all* kinds) down through the gratings which furnish light to the privies, and which are often fringed with disgusting filth. For the same reason, as we have seen, the roofs are used for ashes, garbage, etc. Who can wonder at it? (5) The court is, and has been for a long time, *the nightly resort of a crowd of loafers*, bummers, and roughs—of this and many other, even distant localities—*who keep the tenants in a complete state of terrorism.* On Sundays, especially, this is the playground of these rascals,

* Deducting the space occupied by the two stores, at entrance of both alleys.

as well as numbers of boys and half-grown men, who fight among themselves, pick quarrels with the tenants, run through the houses and over the roofs, meeting remonstrance with personal violence and defying the police. Women of the street are dragged in under the back-stairs and into the cellars by these miserable youngsters, and vice, drunkenness, and terror reign rampant. The police will not follow them into these dark cellars and recesses, and escape is easy by stairways and roofs. Indeed, a smart boy can foil the pursuit of anything less than six or eight policemen. That this condition of things is not altogether due to the character of the tenantry, I am well convinced. From what I have seen of them, I believe them to be as reputable a class of people as can be found in this locality; and, indeed, more so than one would expect to find in this "court." This state of affairs is deeply regretted by them, but they are helpless. The agent and housekeeper reside in the building, but they dare not interfere, and the police, I fear, are content to leave the "court" pretty much to itself. (6) *Ventilation of the rooms* (that is, *thorough* ventilation) *is impossible* in the present state of things. Each room in these buildings has a small window opening directly upon the alley or yard. But, aside from the fact that such an arrangement of windows does not permit of a proper searching ventilation, we must remember that *the only* fresh (?) *air* brought into the room by either window or door, *is already poisoned* from the privies under the yard, and is returned to the yard, only to pass in and out again. In fact, the inmates of the court can only obtain *fresh* air by leaving the court.

As a result of these conditions, I found, at the time of my visits, *thirty-six tenements unoccupied*,* most of which were on the ground floor of the main court, proving that these people, poor as they are, cannot occupy these lower rooms, which are so filled with the effluvia from the cellars and the privies.

That the condition of things thus shown to exist in "Gotham court" is not necessary, is evident from an inspection of "Mullin's court," adjoining No. 32, a similarly constructed tenant-barracks, restricted in space and with a similar arrangement of rooms. This building, although defective in construction, is cleanly, comfortable, and cheerful, and occupied by a contented class of tenants, under control of a female housekeeper, who seems to have no trouble in keeping things straight. And why? Mainly, I think, because the property is not afflicted with the infernal system of privies and cellars which obtains in Gotham court. Privies, and coal and wood-houses, all properly constructed and well kept, are placed in a yard of ample size, at the extreme rear of the long barracks, out of the way.

Gotham court, in my opinion, could be rid of half its terrors by a similar arrangement. By taking down the smithy at the end of the west line of buildings, and also the entire northern end of the main, or eastern, range of buildings opposite, space for a fine yard of nearly sixty by forty feet would be provided, in which ample room could be had for a first-class set of sewered privies, wood and coal bins, hydrant, etc. Then let the cellars and privies be abolished and filled in with earth to within eighteen inches of the lower floors.

If it is argued that the loss of a smithy and twenty tenements, involved by the execution of this plan, entails too heavy a loss upon the owner, I would respectfully submit

* At a subsequent visit there were *forty-five* of these unoccupied tenements, including *all* those on the ground floor.

that the said loss seems to be more than offset by the loss of rent on the thirty-six tenements already standing vacant on account of their insalubrity. Nor can I doubt that the improved health of the court, the better class of tenants it would invite, and the almost complete doing away of the opportunities of rowdyism, vice, and lawlessness (involved in the simple fact of filling up cellars and privies under the buildings and yard) would speedily enhance the actual productiveness of the property.

I am confident that the change I have suggested would tend greatly to ameliorate the present state of things, a state affecting not only the five or six hundred occupants of the court, but of this whole densely populated tenement-house block, which the court penetrates to a depth of two hundred and thirty-four feet.

The only other sanitary alternative is a total demolition of "Gotham court," and perhaps, in view of its present condition, and of the fact that its walls and timbers are pretty well infiltrated with filth and disease, this would be the best thing to do. The rear wall of the west side building of Gotham court (as seen from Mullin's alley, No. 32), is traversed by a very extensive double fissure, extending from top to botton, and which is very unsafe, in my opinion.

Gotham court is a nuisance which, from its very magnitude, is assumed to be unremovable and irremediable. I venture to suggest that it is neither, and I trust I may not be considered as overstepping the proper limits of my position in expressing an opinion that the powers committed to the Health Department, for the protection of life and health, are vast and absolute, and that here is a nuisance, or a combination of nuisances, "dangerous to the life and detrimental to the health" of such a body of people, as seems to warrant a prompt and radical exercise of those powers.

Respectfully submitted.

HENRY R. STILES, M.D.,
Health Inspector.

March 10, 1871.

SUMMARY

Of Inspections and Complaints made in my district from June 1, 1870, *to April* 1, 1871:

Tenement houses (inspected)	1,131
Tenement houses (reinspected)	158
Private houses (inspected)	75
Other houses (inspected)	55
Stores and dwellings (inspected)	38
Boarding and lodgings (inspected)	84
Stores and warehouses (inspected)	48
Factories and workshops (inspected)	32
Public schools (inspected)	11
Public markets (inspected)	2
Public buildings (inspected)	5
Streets, pavements, and gutters (inspected)	181
Piers (inspected)	18
Cellars and basements (inspected)	13
Stables (inspected)	89
Geese-yards (inspected)	6
Total inspections and reinspections	2,858

COMPLAINTS made against

Tenement houses	69
Private houses	20
Other houses	6
Stores and warehouses	11
Factories and workshops	9
Streets, gutters, and pavements	35
Stables	4
Cellars and basements	5
Privies	7
Special complaints against tenement houses	22
	188

CONTAGIOUS DISEASES inspected and reported:

Relapsing fever	55	Sent to Hospital	27
Small-pox	9	Sent to Hospital	8
Typhoid fever	1		
Cholera	1		
Scarlet fever	20		
Total	86	Total	35

Vaccinations, 20; of which 1 was primary.

H. R. STILES, M.D.,
Inspector.

NINTH SANITARY INSPECTION DISTRICT.

A. B. JUDSON, M.D.

NEW YORK, April 1, 1871.

MOREAU MORRIS, M.D.,

City Sanitary Inspector:

SIR—I have the honor to make the following report: The Sixth Sanitary District, composed of the Sixth and the Fourteenth Wards, is bounded by East Houston street, the Bowery, Chatham street, Park row, and Broadway. It includes Mulberry, Baxter, and Bayard streets, and the Five Points.

Cellar and Basement Habitations.—Ten cellars, with an average population of fifty, have been permanently vacated as dwelling-places by order of the Board, on the ground that they were unavoidably dark, damp, and difficult to ventilate and keep clean, and that they also failed to comply with certain provisions of the Tenement-house Law.

On similar complaints, the Board has also ordered the vacation of twenty-two cellars, having an average population of 140, on or before May 1, 1871.

Three tenement houses in Mott street were temporarily vacated for the purposes of cleansing, disinfection, and ventilating. The aggregate population of these houses was ninety persons. Of this number, thirty-two had been removed to hospital suffering from relapsing fever, and new cases were occurring. The houses remained vacant for the above purposes fifteen days. Since this treatment they have been free from fever.

One tenement house (229 Mott street, rear) was vacated by order of the Board on complaint that it had become dangerous to life by reason of want of repair. The tenants were expelled from this house in September, 1870. It remained vacant till the following December, when it was torn down and a new building commenced.*

Sanitary Education of the People.—A valuable result of the labors of the Health Inspector appears in the gradual education of the people to a proper estimate of the importance of ventilation, cleanliness, and light. Thoughtless minds cannot but receive new and lasting convictions on these subjects when they see the hand of authority vacating unwholesome cellars, removing uncleanness, and opening new windows to the light and air.

An incident which shows that some progress is making in this silent method of instruction occurred at No. 245 Mulberry street, where a small and dilapidated rear building is occupied by six families. Finding that the summer was wearing on, and that relief came neither from the landlord nor from the Board of Health, the tenants took counsel among themselves, and made square openings in the brick house-wall to admit light and air into their respective bedrooms.

Vital Statistics of the Fourteenth Ward.—An examination of the vital statistics of the Fourteenth Ward shows the value of whatever improvements may have been made in the condition of the occupants of tenement houses:

Population, first census of 1870	29,694
Mortality in 1869, Bureau Vital Statistics	757
Tenement-house population, Sanitary Survey, 1869	19,106
Mortality in tenement houses in 1869, Bureau Vital Statistics	536

It thus appears that the death rate of the ward was 25.5 in 1,000, that the death rate in houses other than tenement houses was 20.8 in 1,000, and that the death rate in tenement houses was 28 in 1,000. In other words, sixty-four per cent. of the population live in tenement houses, while seventy-one per cent. of the deaths occur in houses of this class. The practical deduction from these figures is, that the first step in reducing the mortality of this ward, and of the city, is to improve the sanitary condition of the dwellers in tenement houses.

Vaccination.—The following table shows the proportion of vaccinated and unvaccinated persons in the total number of small-pox cases in this district:

	NUMBER OF CASES.	AVERAGE AGE (YEARS).
Unvaccinated (from 3 months to 23 years)	15	5
Vaccinated (from 11 years to 41 years)	23	27
Unknown (1 month to 42 years)	16	16
Total	54	17

* The Superintendent of Buildings has done a good sanitary work by demolishing tenement-house rookeries at 50 Park street, rear, and 35 Baxter street, middle.

In one of these cases varioloid seemed to follow vaccination and revaccination. It was in a German woman who had a good vaccine scar received in childhood, and exhibited a small, prominent, round, white cicatrix as the result of revaccination performed about three years before on board an emigrant ship.

Houses visited in vaccinating	168
Revaccinations in tenement houses	201
Revaccinations in schools	166
Vaccinations	131
Total	498

RESULTS OF VACCINATIONS AND REVACCINATIONS.

	INSPECTED ON THE EIGHTH DAY.	FAILURES.	GOOD VESICLES.	FAIR VESICLES.	REVACCINE PUSTULES.
Vaccinations	77	18	51	8	.....
Revaccinations	104	60	.....	.....	44

Of the eighteen vaccinations which failed, five succeeded on subsequent trial, and thirteen were not tried again.

In one case, a child of five months, the vaccine sore and a variolous eruption were developed synchronously.

The sore resulting from revaccination differs, in my observation, from the vaccine sore in the following points. It arrives at maturity earlier, so that on the eighth day it appears as a pustule rather than a vesicle. It also seems to be of a coarser nature than the vaccine sore, being more convex in general shape, and lacking the fine texture and delicate coloring of the true "pearl upon the rose."

In two cases slight untoward appearances followed the application of vaccine virus. In the case of a child two months old, vaccination was followed on the eleventh day by a good but broken vesicle. On the thirty-sixth day the pustule was unhealed, and near it was a small group of irregular scabs, as if accidental abrasions had been irritated by the fluids of the original sore. It was unlike any recognized specific inoculation, and resembled the transient cutaneous blemishes frequently seen in children.

The second case was that of a boy fourteen years old, who showed a good vaccine scar received in infancy. On the ninth day after revaccination the pustule was broken and attended by swelling and redness of the arm and forearm, and induration and enlargement of the axillary glands. On the eleventh day the symptoms were all rapidly subsiding without treatment. This boy's brother, sixteen years old, was revaccinated the following day at a dispensary. As the result in his case was similar, only still

more severe, it is evident that this undue excitement was chargeable to constitutional peculiarity.

A fatal case of small-pox occurred at the corner of Leonard and Baxter streets in a girl who seemed to have contracted the disease on Blackwell's Island. She had never been vaccinated. On the sixth day after her return from the island, where she had resided five months, she was taken sick with the initial fever of small-pox, of which she died at the hospital.

This case calls to mind the words of Dr. J. P. Loines, in reply to a Committee of the Metropolitan Board of Health (page 314, Annual Report, 1868, State edition). His advice is as follows: "That the Police Department cause all persons under their control, and all others who receive any benefit, such as lodging, etc., to be vaccinated; also, that the Commissioners of Charities and Correction, as well as all other public bodies having the care of the poor, comply with the above rule in all institutions under them, and withhold all in and out-door relief of any kind until vaccination is performed, or the dates of previous vaccination ascertained."

This district has suffered, with the rest of the city, from filthy streets and gutters. The mixture of horse-manure and various pulverized mineral and vegetable materials which defiles the pavements in wet weather, rises in dry and windy weather in clouds of pungent and offensive dust. At one time it retains the water, which would run into the sewer or quickly evaporate from clean pavements, and thus exposes pedestrians to wet feet, and creates a condition of uncleanness which our instinct tells us cannot but promote disease. At another time it vitiates the air we breathe, producing irritation of the air-passages and conjunctivæ, and perhaps serving as a vehicle for the dispersion of germs of disease.

I have been struck by the clean and white appearance which certain pieces of well laid stone pavement present after a heavy shower of rain. If all the street and sidewalk pavements were laid with a proper inclination, and if the gross dirt were properly removed by the authorities, I do not see why the paved portions of the city should not, for a few hours after every rain-storm, be absolutely free from mud and dust.

Emigrant Vessels.—In the first quarter of the year I made inspection of fifty emigrant vessels (three sailing vessels and forty-seven steamers). Each inspection was followed by a written report detailing the sanitary condition of the vessel. These ships were all inspected after reaching the city, excepting one, which was boarded in the stream. In the two following cases it was necessary to cause the destruction of material which had become dangerous by exposure to infection.

The steamship The Queen arrived from Queenstown in January with 328 passengers. Five cases of typhus fever were removed at Quarantine, and the vessel came to her pier at the foot of West Houston street, with a quantity of soiled mattresses (100 in number) in the steerage, and ready for sale to the dealers. This material was seized by order and burned in the vessel's furnaces.

The ship John Bartram arrived in January, 1870, 103 days from Hamburg, with 448 passengers. Nineteen deaths had occurred on the voyage and twenty-eight patients were removed at Quarantine. She was inspected while at anchor off Governor's Island. The steerage apparently had not been cleaned for many days, and the decks were encumbered with dirt, rags, and fragments of food. Some of the berths contained soiled

bedding, loose bed moss, and discarded clothing. The captain was directed to collect this mass of filthy matter, and to scrub the steerage thoroughly before coming to the city. When the ship came to pier 46, East river, she was disinfected, and the above objectionable material was removed in the wagon of the disinfecting corps and burned in the open space at Corlear's Hook.

The above cases have strengthened the opinion that considerable risk comes from the customary treatment of the refuse material from emigrant vessels. I beg leave to suggest the question whether the sanitary supervision which is instituted at Quarantine should not be continued over certain classes of vessels, as West India vessels in summer, and emigrant vessels the year round, as long as they remain in port.

SUMMARY.

MATTER AND PLACE INSPECTED.		INSPECTIONS.	COMPLAINTS.
Tenement houses	.....	725	133
Private dwellings	.....	48	5
Boarding houses	.....	2	1
Cellars and basements	.....	154	36
Manufactories	.....	4	.....
Fat-rendering establishments	.....	7	.....
Workshops, stores, etc	.....	13	1
Sunken and vacant lots	.....	3	1
Horse and cow stables	.....	235	.....
Yards, courts, and areas	.....	51	21
Waste-pipes and drains	.....	54	21
Privies and water-closets	.....	94	25
Streets, gutters, and sidewalks	.....	67	18
Markets and stands	.....	3	.....
Rescue stations	.....	34	.....
Immigrant vessels	.....	65	.....
West India "	.....	5	.....
Other "	.....	3	.....
Small-pox cases	120		
Relapsing fever, at residences	223		
" " receiving ward, Bellevue Hospital	452		
Scarlatina	34		
Typhoid fever	19		
Typhus "	7		
Yellow "	2		
Contagious diseases, cases	.....	857	
Violations of Code	.....	4	4
Smoky chimneys	.....	11	2
Dangerous	.....	5	1
Total	.....	2,443	269

Respectfully submitted.

A. B. JUDSON, M.D.,
Assistant Health Inspector.

TENTH SANITARY INSPECTION DISTRICT.

INSPECTOR W. H. B. POST, M.D.

NEW YORK, April 1, 1871.

DR. MORRAU MORRIS,

City Sanitary Inspector:

SIR—I have the honor to submit the following report of labor performed by me in connection with the Health Department, from April 1, 1870, to April 1, 1871:

Location of Districts.—During the first eight months of the time to which this report refers I had charge of portions of the Eleventh and Seventeenth Wards. During the past four months my duties have been confined to the Seventh and Tenth Wards. I have found the tenement houses in the two former wards, as a rule, much better in respect to ventilation than in the latter. As to general cleanliness and other matters connected with sanitary interests, I do not notice much difference in the two sections. Throughout both of these districts the work of sanitary reform has been progressing steadily, though slowly, during the past year. I find fewer dirty yards and alley-ways, and a much smaller number of filthy privy-vaults and cellars than formerly observed.

Compliance with Orders of the Board.—In very many instances I find it simply necessary to instruct the owners of property upon which a nuisance exists as to the proper remedy, in order to secure its early abatement. I believe that the feeling of the Board's authority is much more generally appreciated than ever heretofore. During the past year, contrary to my experience in former years, I have found non-compliance with the orders of the Board the exception rather than the rule. Tenement-house owners as a class have learned to appreciate the necessity for prompt compliance with the orders of the Board, finding it a much simpler, and in the end a much more economical matter to attend at once to the ordinary requirements of decency and health than to combat the Board in the courts, and eventually be forced to do the work in addition to paying a heavy bill of judgments and costs. Hence it is that papers rarely require a second reinspection from an inspector. I also believe that tenants generally know more about the Health Board, and understand its bearings upon their own condition, and are more ready and anxious to avail themselves of its remedial efforts than ever heretofore. In many instances these people have materially assisted me with information concerning obscure nuisances, which might otherwise have escaped my notice, and have facilitated my labor by straightforward answers to questions.

Condition of Water-side Sections.—The water-side sections of the city are more prolific of nuisances than those further removed from the rivers. Here I usually find the most miserable class of tenement houses, the dirtiest manufactories, and the largest and filthiest stables. In several of the streets immediately adjacent to the East river, the land is so low as to render the construction of sewers unadvisable. Consequently, the privies and water-closets in these neighborhoods, being devoid of sewerage, fill rapidly, and constitute a constant and very grievous nuisance. I do not know of any means by which this evil can be remedied.

Sewerage near River.—Where sewers have been made in streets bordering upon rivers,

it has invariably been found that the tidal reflux through the individual sewer-pipes has flooded yards, cellars, and basements, and left the premises in far worse condition than before the construction of the sewers. The large majority of febrile diseases which come under my observation occur in these river streets or those closely adjacent to them. This is partly to be accounted for by the wretched class of tenement houses in these streets, but chiefly by the fact that a considerable portion of these sections is composed of "made land," where the cellars and basements are almost constantly damp, and occasionally flooded with water from natural causes, and where proper drainage is impracticable for the reason given above. Thus, the fall of the year brings with it an increase in the several forms of fevers, such as typhus, typhoid, and remittent fevers.

Contagious Diseases.—I would notice, in this connection, the remarkable decrease of small-pox and relapsing fever in the Eleventh and Seventeenth Wards during the summer and autumn months of 1870. I believe this comparative immunity from the former disease to have been chiefly due to the thorough and systematic vaccination in public schools and tenement houses, and also to the prompt and uniform manner in which patients have been removed to hospital, and to the thorough way in which fumigation and disinfection have been employed. Scarlatina occurs about as frequently as usual; but I am convinced that the manner in which it is now dealt with by the Health Department will do much towards circumscribing its ravages.

The added experience of each day teaches me more and more that, in the management of contagious disease among the tenement-house population, the only safety to the masses is in the early removal of the patient to hospital. With the ignorance, wilfulness, peculiar habits, and constant intermingling of the inmates of these houses to contend against, I do not believe that isolation can ever be relied upon. In a few instances I have tried the experiment of leaving the patient in his home, when, from the situation of the apartments, and the apparent intelligence of friends, I have thought quarantining practicable, but I have invariably regretted having done so in the end. It is false clemency to consult the comfort or wishes of the individual patient at the almost certain risk of infecting his neighbors. However hard may appear the necessity in any particular case, I have learned by experience to recommend the removal of a relapsing fever or small-pox patient to hospital from a tenement house as an absolute rule, without a single exception.

Local Superintendence in Tenement Houses.—I would again urge the important necessity for local superintendence in tenement houses. The larger and better classes of tenement houses are generally provided with some person who is charged with the responsibility of keeping the premises in a cleanly condition. Thus far I have noticed a marked change for the better in such houses, which I can attribute to no other cause than the beneficial effects of the superintendence itself, as the local surroundings and the character of the tenants changes very little from year to year. Very few of the smaller houses have superintendents, and the character of these tenements is, as a consequence, generally very much inferior to that of the larger ones.

Condition of Streets.—Up to the beginning of the past winter the general condition of the streets was a marked improvement upon that of the preceding year. But since the first fall of snow I have noticed a great degree of carelessness in street-cleaning and the

removal of garbage. In many streets, particularly in those closely adjacent to the water-front, such as South, Front, Water, Cherry, and Monroe streets, and the narrow cross-streets running into them, the accumulations of garbage and every variety of street-filth have been a disgrace to that portion of the city. All along Water, Front, and Cherry streets, especially, there have been for upwards of four months past solid masses of animal and vegetable garbage, mud, and rubbish, many feet in length and breadth, and from one to three feet in height, these centres of filth having been apparently undisturbed since the snow and ice first concentrated them in masses. Many of the street-gutters have been completely obstructed with ice and garbage along whole blocks for months together. Recently the sun and warmth of spring have partially accomplished what nominal street-cleaning had neglected, many of the heaps having thawed and melted away, and are now flowing in reeking streams over the surface of the streets, and through the gutters into the sewers.

Stables.—I find very many of them without vaults or boxes for the reception of manure, destitute of sewerage and drainage, and with yards and alley-ways adjacent in an exceedingly filthy condition with manure and foul stabling straw. Very many stables are not cleaned for weeks at a time, the manure being suffered to lie strewn over the surface of the yards, or to accumulate in open boxes until the manure-cart "happens to come along," the filth being concentrated by such accumulation and the atmosphere being tainted for many rods in their vicinity. In a few instances I find stables in the cellars of tenement houses and dwellings. The Board has issued many orders for the construction of manure boxes and vaults, and the cleansing and disinfection of stable yards and alley-ways, during the past two months.

Smoke Nuisances.—Along Cherry, Water, Front, and South streets there are many large manufactories of various kinds. Some of these are furnished with appliances for consuming the smoke, while others, in the immediate vicinity of dwellings and tenement houses, have no means of such consumption, and allow dense masses of smoke and steam to escape into the air, contaminating the atmosphere surrounding, and entering through the doors and windows of adjacent houses.

SUMMARY.

The following table exhibits the work performed by me during the period to which this report refers:

INSPECTIONS AND REINSPECTIONS.

Tenement houses	2,320
Cellars and basements (special)	170
Yards, courts, and areas	22
Privies and water-closets (special)	131
Stores, factories, and public buildings	15
Waste-pipes, drains, etc	10
Stables	304
Fat-boiling houses	36
Streets, sidewalks, and gutters	108
Private dwellings	88
Vessels in harbor	2
Total	3,206

CONTAGIOUS DISEASES AND VACCINATION.

Varioloid and variola	123	Typhoid fever	10
Varicella	5	Typhus fever	4
Scarlatina	71	Relapsing fever	54
Rubeola	4	Vaccination	1,971

The following table exhibits the number of complaints forwarded to the Board during the same period:

Tenement houses	1,444
Cellars and basements (special)	78
Yards, courts, and areas	12
Privies and water-closets (special)	74
Stores, factories, and public buildings	6
Waste-pipes, drains, etc	9
Stables	80
Fat-boiling houses	13
Streets, sidewalks, and gutters	100
Private dwellings	4
Vessels in harbor	2
Total	1,822

All of which is respectfully submitted.

WILLIAM H. B. POST, M.D.,
Health Inspector.

ELEVENTH SANITARY INSPECTION DISTRICT.

INSPECTOR H. DEW. JOY, M.D.

DR. MOREAU MORRIS, *City Sanitary Inspector.*

SIR—I have the honor to submit the following report upon the general sanitary condition of the districts under my charge, from June 1, 1870, to April 1, 1871.

These districts have represented portions of the Tenth, Fifteenth, and Seventeenth Wards, and are bounded by the north side of Grand street, the south side of Fourteenth street, the east side of Broadway from Houston to Fourteenth street, the east side of Bowery to Grand street and to the East river.

Population.—With the exception of the northerly and easterly borders, the population is altogether German. From Fourteenth street to Eighth street, and from Second avenue to Broadway, the dwellings are mostly of the better class.

Tenement Houses.—In Twelfth and Thirteenth streets, east of First avenue, the class of tenement houses is very inferior. Stables and dwellings are so mingled together that, should an epidemic occur, this locality would seem a fit place for the spread of disease.

Quite a number of the tenement houses outside of the above-mentioned limits have

housekeeper or owner on the premises, who are responsible for the cleanliness of the building; and, were this required in all cases, the sanitary condition of this class of dwellings would be vastly improved.

Stables.—In East Twelfth and Thirteenth streets, between Avenue A and First avenue, there are several stables in groups, which should be torn down, the ground filled in, and properly drained.

Contagious Diseases.—The decided steps taken by the Board during the early part of the summer of 1870, in removing cases of small-pox to the hospital, disinfecting, etc., had the desired effect of promptly checking the disease in this district.

In but two instances has small-pox reappeared in the same house, in my experience, in both which instances neglect of early reporting the cases was the cause.

Scarlet fever was also very prevalent, being carried from family to family in the clothing, at public schools, the city conveyances, etc. It was no uncommon thing to see children from several different families playing in the same room where scarlet fever existed. In cases of death from the disease, the several mothers in the house, and mothers from different parts of the city, would come to condole with the afflicted, thus spreading the disease, and it was some time before the danger to be apprehended from contagion could be impressed upon the people.

Number of cases of small-pox	64
" " scarlet fever	80
" " typhoid and relapsing fever	19
Total number cases of contagious disease	163

The number of vaccinations since June 1, 1870, are as follows:

	PRIMARY.	SECONDARY.
Ward schools	157	1,085
Tenement houses	52	70
	209	1,155
Total number of vaccinations and revaccinations		1,364

The following list shows the amount of work performed, dating from June 1, 1870, to April 1, 1871.

Summary of Work for the Year ending April, 1871.

	TOTAL INSPECTIONS.	CAUSES OF COMPLAINT.
Tenement houses	781	108
Private "	35	6
Privies and water-closets	100	35
Stables	279	5
Lard-rendering establishments	9	2
Cellars and basements (special)	60	3
Factories	11	10
Streets, gutters, and sidewalks	50	42
Total	1,325	206

Respectfully submitted.

H. DE W. JOY, M.D.,
Health Inspector.

April 1, 1871.

TWELFTH SANITARY INSPECTION DISTRICT.

ASSISTANT HEALTH INSPECTOR EDWARD FRANKEL, M.D.

MOREAU MORRIS, M.D., *City Sanitary Inspector:*

SIR—I have the honor to present the following report concerning the sanitary condition of the Twelfth Sanitary District, which has been under my care since the 1st of July, 1870.

This district comprises the whole of the Thirteenth, a small portion of the Tenth and Seventeenth, and about one-third of the Eleventh Wards; extending from the east side of Essex street to the East river, its lateral boundaries being formed by Grand street on the south and Houston street on the north.

Population.—The district included within the above limits comprises one of the most densely-populated and filthy portions of the city. With the exception of a few scattered private dwellings, which, with stables and manufactories, compose about one-fifth of the buildings in the district, the remaining four-fifths are made up of tenement houses, about one-third of which formerly were private dwellings, and are now adapted to serve the purpose of tenement houses. Those recently constructed and inhabited by the middling classes are kept in good hygienic condition; the majority, however, furnish constant cause for complaint, being occupied by the lowest classes, whose habits or occupations naturally tend to a violation of important sanitary laws. The co-operation of these people in any attempt made towards sanitary reformation or improvement is an essential necessity, without which no satisfactory result can be attained.

Streets.—But, in many respects, owing to a rigid enforcement of the health laws, a

marked improvement is manifest, not only in the condition of the houses, but in the general appearance of the district. Several streets have been repaved, many gutters, sidewalks, and alleys have been repaired, and the streets more frequently and thoroughly swept.

Ventilation.—The importance of ventilation as a means for the prophylaxis of disease is not sufficiently understood by the tenants to insure this hygienic necessity. In almost all tenement houses built for such occupation, proper ventilating windows from the bed-rooms to the sitting-rooms and halls have been introduced, as also in those which were formerly private dwellings, except where the original construction of these houses prevented the possibility of adapting two windows. But when a sanitary defect has been remedied by the Inspector, the change, in most cases, is neither appreciated nor made use of; reinspections prove that the introduction of these windows does not contribute to purify the confined air of these rooms; they are constantly kept closed, notwithstanding I have endeavored in every case to impress upon the tenants the importance of keeping them open, at least during a portion of the day. I would suggest that instead of glazed sashes wired frames be used, with meshes sufficiently small to prevent strong gusts of air from the halls, and to secure ventilation. In most of the houses the hall ventilation is perfect.

General Condition of Tenement Houses.—A rigid enforcement of the Tenement-house Law has been instrumental in improving the general condition of the houses in a marked degree, though some of the older buildings are in a very dilapidated state, the owners not keeping them in good repair on account of the habits of neglect and uncleanliness of the tenants and the small rents received.

Cellars and Basements.—There are, in the district, comparatively few cellars occupied by families, and these have been made, as far as possible, to comply with the law. But, notwithstanding there is a layer of cement or a space between them and the ground, the emanations from the adjacent soil, and, in case of proximity to a privy-vault, noxious gases, continue to exert a deleterious influence on the health of the occupants. Their occupation ought entirely to be prohibited, the more so as higher locations in tenement houses can be obtained for an equivalent amount.

Sewerage.—The sewerage in the district is still very imperfect, the following streets still being unsewered: Attorney street, between Grand and Broome, and between Stanton and Houston streets; Pitt street, between Broome and Delancey streets; Sheriff street, between Broome and Grand streets; Cannon street, between Grand and Delancey streets; Goerck street, between Grand and Broome streets, and between Delancey and Houston streets; also the whole of Mangin and Tompkins streets. Mangin, Goerck, and Tompkins streets, being reclaimed land, a want of proper sewerage can only add to the insalubrity of this portion of the district.

Privies, etc.—A large number of complaints have been received against privies, and as a rule against those having sewer connections, which become obstructed owing to inadequate means of flushing and the introduction of foreign substances by the tenants. The constant use of disinfectants in privies would be of advantage in purifying the air in many portions of the district.

Garbage, etc.—One of the greatest wants under which the district suffers is the absence of proper receptacles for garbage; this is thrown into the streets, yards, privies,

and interspaces between rear houses, where it is allowed to accumulate. In some cases, days elapse before it is removed from the sidewalks and gutters, in the meanwhile decomposing and giving rise to foul emanations. The construction of some permanent covered receptacle would materially improve the appearance and health of the district.

Rag and Bone-picking.—A large number of rag and bone-pickers in Willett, Sheriff, and Mangin streets having persisted in storing these articles in their cellars and houses, the Inspector has in a great measure prohibited the continuance of the business in this manner by requiring the chiffonniers to transfer the offal immediately to wagons for conveyance to factories beyond the city limits.

Stables.—The number of stables in the district is very large, and very few of them are kept in a clean and wholesome condition; very few have drains or direct sewer connections; the boxes, as a rule, are not furnished with covers, and the manure is usually removed only once in two weeks.

Fat-rendering, etc.—Almost all of the fat-rendering establishments are now kept clean, and are provided with sewer connections. The offensive odor is now conveyed off by flues having direct communication from covered kettles with the chimneys.

Contagious Diseases.—Within the last few months the district has been visited by a mild epidemic of scarlatina, the spread of which was in a great measure checked by proper isolation of the patients and the liberal use of disinfectants. The district being not contiguous to the up-town districts where small-pox has lately prevailed to such an alarming degree, the few cases which occurred were immediately removed to the hospital, and vaccination of all the tenants of the house, and of those in proximity, instituted.

Special Duty.—In conclusion, I would state that a considerable portion of my time has been occupied in the investigation of the adulterations of food, in connection with Inspector Dr. Leo, concerning which special reports have been made.

SUMMARY.

The following is a summary of the labor performed by me since July 1, 1870, in inspection and reinspection:

Tenement houses	1,051
Private dwellings	56
Privies	93
Premises occupied by stables	359
Factories	14
Fat-rendering establishments	26
Sausage manufactories	5
Cellars	39
Stores and warehouses	18
Marble yard	1
Brewery	1
Gut-cleaning establishments	2
Poultry yards	2
Cases of contagious disease	150
Total	1,812

Number and classification of complaints against—

Tenement houses	231
Private dwellings	87
Privies	25
Stables	51
Factories	4
Fat-rendering establishments	2
Sausage manufactories	1
Cellars	13
Storage houses	5
Brewery	1
Gut-cleaning establishments	2
Poultry yards	2
Rag and bone pickers	32
Streets	7
Gutters	15
Total	428

Number of houses visited in vaccination, 17.

Primary vaccinations	51
Secondary "	34
	85

CASES OF CONTAGIOUS DISEASES.

Variola	48
Varicella	9
Scarlatina	55
Measles	2
Typhoid fever	5
Relapsing fever	27
Yellow fever	4
Total	150

Respectfully submitted.

EDWARD FRANKEL, M.D.,

April 1, 1871. *Assistant Health Inspector.*

THIRTEENTH SANITARY INSPECTION DISTRICT.

ASSISTANT HEALTH INSPECTOR F. HEUEL, M.D.

MOREAU MORRIS, M.D., *City Sanitary Inspector:*

SIR—I have the honor of transmitting to you my report relative to the condition of the Thirteenth Sanitary District, which is now under my supervision.

Boundaries and Topography.—This district, a part of the Twelfth Ward, Harlem, is bounded on the south by One Hundredth street, on the west by Sixth avenue, and on the east and north by the East and Harlem rivers. The south-west corner, extending from

One Hundred to One Hundred and Tenth street, and from Fifth to Sixth avenue, is included in the Central Park. The greater portion of the district is but a few feet above the tide level. Most of it, and especially that portion which is east of Third avenue, is almost entirely composed of low, marshy ground. There are several water-courses, even now, existing in this district, and several more which have been in part obliterated by advancing improvements. The highest points found here are at Mount Morris square, and in One Hundredth street, between Third and Fourth avenues. There are also in this district several ponds and sites of ponds which, within the past few years, have been filled up.

Malaria.—The influence exerted upon the health of the inhabitants by the topography cannot be over-estimated. This year has been marked by the prevalence of an epidemic of malarial fevers, and the rule has been that people residing upon or near these water-courses and ponds, or upon the sites of former water-courses or ponds, have invariably been the first to succumb to and the last to recover from these maladies. In this connection I would state that as but few of the streets are yet opened, and still fewer paved or sewered, and as, on account of the peculiar topography of the district, no definite plan of drainage has as yet been agreed upon, there exists no system of thorough and deep drainage, which presents itself an absolute necessity to the well-being of the residents of this part of the city.

Streets.—Another evil influence upon the health of this portion of the island is found in the condition of the streets. With no pavement and no general direction of slope, made, as they are in many cases, from refuse material, they themselves are foci of disease. In many instances they are, after a heavy rain, so flooded as to be almost impassable, and this water often remains until it is offensive not only to the eyes but to the olfactory sense. The contractors who clean, or rather who leave the streets dirty, say that they fulfil their contract, so that other means are necessary to abate this nuisance. Much good has been done by the action of the Board of Health in causing portions to be filled up and others to be drained.

Vacant Lots.—Throughout this district there are many vacant lots, most of which are below the level of the streets. In these water accumulates, and this, contaminated by refuse from the streets, stables, houses, factories, etc., forms a fluid which cannot but give rise to disease. Very often days are consumed in finding out the owners or agents of these lots, in order to have them filled up sufficiently to be drained. Each owner should be compelled to have his property thoroughly drained.

Areas, Yards, etc.—A great change for the better has taken place in the condition of the areas, etc., in this district, owing to the enforcement of the laws of the Board of Health. Most of them are now kept properly cleaned, and in almost all cases some system of drainage has been adopted.

Privies, Manure-vaults, etc.—Owing to the want of a system of sewerage in this district, privies retain their place to the almost total exclusion of water-closets. One of the most frequent violations which the Inspector is called upon to notice is the filthy condition of these privies. In many instances this is owing to the negligence or criminal carelessness of the tenants themselves, though more often due to the imperfect construction of the premises or to the neglect of the landlord or owner. I think the system of privies for tenement houses is far preferable to that of water-closets, since the dwell-

ers in these houses are as a rule too ignorant and careless to take the requisite care to keep water-closets in order. The constant personal supervision of the Inspector is necessary to prevent their filthy condition giving rise to disease.

Stables, etc.—In this district there are a great number of stables, and places where cattle, sheep, goats, etc., are kept, in many instances in direct violation of the Sanitary Code.

Fat Boiling.—There is a fat-rendering establishment at the foot of One Hundred and Fifth street and East river. Efforts have been made by the proprietors to make it, as far as possible, conform to the regulations of the Board. A little greater care is requisite, however, in its management.

Domiciles.—Buildings occupied as dwellings may be divided into three classes:

1st—Private dwellings.

2d—Tenement houses proper; buildings used as tenement houses.

3d—Shanties.

The first class are almost without exception large, comfortable, well-built, and furnished with all the modern improvements.

The second class comprises those buildings which were intended as tenement houses and those which are used as such, although the owners endeavor to evade the spirit of the law. In the first class the improvement has been so marked that few of them would be recognized as tenements if compared with the old standard of tenement houses.

The third class, the shanty or temporary wooden structure, cannot be spoken of except in terms of condemnation. Vacant lots are seized upon by squatters who erect temporary abodes thereupon. Many of the occupants are swill-gatherers, rag-pickers, etc. And here squalid poverty seeks a shelter: dogs, hogs, goats, geese, and human beings are packed together in these dens. Although the dwellers are a hardy and vigorous lot, yet so great is their disregard for all sanitary rules, that many epidemics have their origin in these districts. Although these shanties are temporary and vanish with advancing improvements, it would be far better for the city, both as regards its moral and sanitary good, if they were at once eliminated. The majority of the criminals of the city have their origin in these very dens. They require the constant care and supervision of the Inspector; but, from the nature of the thing, it is almost impossible to carry out fully the Sanitary Code.

Dumping Grounds, etc.—Until the present date, two great nuisances have been a source of constant complaint by the residents of this district. I allude to the dumping grounds at the foot of One Hundred and Ninth and One Hundred and Nineteenth streets. Here vast quantities of refuse animal and vegetable matters were allowed for days exposed to the sun, and thus to ferment and poison the atmosphere with vile emanations. They have, however, been abolished by the Board.

Below is given a synopsis of a portion of the inspection work done by myself since entering upon the duties of my office.

In conclusion, the Inspector would state that the labors of the Board are appreciated by all intelligent citizens, who see in them the means of not only preventing disease but also of assisting people who, but for the aid thus afforded them, would be exposed to all the influences which tend to destroy them both physically and morally.

SUMMARY.

Number of Inspections and Reinspections, and also Number and Character of the Complaints forwarded.

	NUMBER INSPECTIONS AND REINSPECTIONS.	NUMBER COMPLAINTS FORWARDED.
Of Tenement houses	497	54
" Private dwellings	468	13
" Shanties	177	6
" Other dwellings	109	4
" Cellars and basements	243	9
" Other buildings	96	4
" Stables	328	23
" Privies	547	13
" Lots, etc	189	15
Total	2,654	139

I was transferred, on December 1, 1870, to that sanitary district lying between Houston and Fourteenth streets, Avenue A and East river, which includes portions of the Eleventh and Seventeenth Wards.

Topography.—Almost the entire district was formerly the site of salt-water marshes, or the river bank. Numerous small water-courses following the general slope of the land formerly flowed north-easterly to the East river. They being cut off by the improvements which have taken place, of course can no longer aid in draining this part of the city. The average elevation of this portion of the city above low-water mark is only from eleven to thirteen feet at the western or highest portion, and seven to nine at the eastern or river side, the highest point being about twenty feet above tide mark.

From the above it results that quite a large portion of this district is rendered very insalubrious by its general geological and topographical conformation. Its soil, composed as it is of refuse material and the want of a good drainage, added to the presence of a large tenement-house population, badly constructed domiciles, neglect of personal cleanliness, which is here very marked, neglect of surroundings, insufficient water supply, filthy privies, damp cellars, very often cellars half filled with water, dirty and damp courtyards, and the presence of numbers of old shanties used as stables, etc., all render

this a district where the utmost care is requisite to prevent the outbreak of contagious diseases.

Tenement Houses.—This district is generally occupied by tenement houses, private residences being the exception; many of the so-called private houses just come within the legal definition—less than four families in a house. As a general rule these tenements rate as good; there are, however, exceptions to this in Second street, between Avenues B and C, Eleventh, Twelfth and Thirteenth streets, from Avenue A to the East river. The average number of families in these houses is ten, average number of persons forty-two.

The sanitary condition of these tenements varies with—(1) The character of the building; (2) The nationality and occupation of the residents; (3) The character of the agent or owner; and (4) The employment of a housekeeper.

A great improvement in the condition of the tenants would result if by any means each family could be more isolated, as by dividing the houses into parts accessible only to the tenant occupying them, so that each family would feel that they alone occupied and were responsible for their portion of the dwelling.

Sewers, Water, etc.—This portion of the city is so little elevated above low-water mark that at high tide the sewers are filled with water. During severe storms not only the cellars but the yards and streets are flooded. This leads to contamination of the ground with the contents of privies, to foul and damp cellars, and to unhealthy emanations, which but too plainly show, in the great prevalence of miasmatic diseases. There is in this district a deficient supply of water, especially where there are rear tenement houses, where often a single hydrant in the yard has to do duty for the twenty or thirty families residing in both houses. In this connection I would suggest that tenement-house owners be compelled to erect baths on each floor—say one to every three or four families—in order that personal cleanliness may be properly observed. No one at all acquainted with dispensary practice can have failed to observe the extreme filthiness of the persons of the majority of the patients.

Privies.—Some form of water-closet connected with the sewer and properly flushed daily is greatly needed here; one that is not liable to be obstructed or to get out of order, and which does not require care and attention, as the school sink for example. It should be the duty of some one tenant to see that it is attended to daily. This would, no doubt, greatly improve the condition of our tenement-house population.

Ashes, Garbage, etc.—The irregularity with which ashes, garbage, etc., are collected, and the refusal of the collectors to remove articles of an offensive nature, or which have been deposited upon the street or in the gutters, is a source of constant complaint, and one of the prominent causes of the filthy condition of our streets, as was the case with Second, Eleventh, Twelfth, and Thirteenth streets. In these places piles of garbage decompose and poison the surrounding air, thus exerting an injurious effect not only upon the general health but upon the morals of the residents. As a general rule, every tenant has some receptacle for garbage and ashes, such as an old pail or a tin pan, but the houses are nearly all wanting in receptacles for this refuse. Landlords should be compelled to provide wooden, or, better, metallic boxes for this purpose, and the collectors be made to gather early each morning the contents of these boxes. No contractors can keep the streets clean if tenants are allowed to throw these substances into them. The

aid of the police is necessary to arrest all and every one who deposits any ashes or garbage in the streets. A strict enforcement of these rules has been found in many large European cities to result in almost perfect cleanliness.

Basements and Cellars.—The basements and cellars in this district are, as a rule, not inhabited, and where they are will soon be vacated.

Pavement.—With the exception of the avenues, the pavement in this district is as bad if not worse than any other portion of the city. The gutters also need attention; many of them are so badly constructed as to prove rather a nuisance than a benefit. Any improvement in the condition of the streets would be followed, in my opinion, by a corresponding improvement in the sanitary condition of the residents.

Diseases.—In this district there have occurred during the past two months eight cases of small-pox, of which five recovered and three proved fatal; sixty-four cases of scarlatina, and two cases of typhoid. There were also two cases of varioloid. These are all the cases of contagious diseases in this district.

Below is a table of the inspections and reinspections made by me, together with the number of complaints forwarded:

	NUMBER INSPECTED AND REINSPECTED.	NUMBER COMPLAINTS FORWARDED.
Of Tenement houses	586	187
Private dwellings	52	22
Other "	3	3
Cellars and basements	15	4
Public buildings	2	0
Stores and warehouses	1	0
Factories and workshops	12	8
Markets	1	0
Stables	598	8
Gutters and streets	3	3
All other buildings	16	5
Privies	29	12
Chimneys	10	3
Contagious diseases—		
Small-pox	8	
Scarlatina	64	
Typhoid	2	
Varioloid	2	
	1,404	255

Respectfully submitted.

FR. HEUEL, M.D.,
Assistant Health Inspector.

106 Second avenue, April 1, 1871.

FOURTEENTH SANITARY INSPECTION DISTRICT.

INSPECTOR PHILIP O'HANLON, M.D.

MORRAU MORRIS, M.D., *City Sanitary Inspector:*

SIR—I have the honor to forward the following report of the condition of the Fourteenth Sanitary District of the City of New York, from the 1st day of April, 1870, to 1st of April, 1871.

I was appointed Health Inspector June 1, 1870, and assigned to duty in the district comprising the Third and Fifth Wards of this city.

I was subsequently assigned to my present district, which is bounded on the north by the south side of Twenty-sixth street, on the east by the East river, on the south by the north side of Fourteenth street, on the west by the east side of Sixth avenue.

The following is a summary of the duties performed by me for the time stated:

Tenement house inspections	1,564
Reinspections	272
Private dwellings	31
Other dwellings	57
Cellars and basements	59
Public schools	5
Factories and workshops	22
Public markets	2
Stables	257
Vacant lots	19

The complaints forwarded were as follows:

Tenement houses	138
Private houses	16
Cellars and basements	16
Privies	33
Vacant lots	6
Total	209

Number of families visited on vaccinating duty	71
Vaccinated primarily	65
Revaccinations	198

Contagious diseases:

Small-pox	48
Scarlet fever	65
Typhoid fever	7
Relapsing fever	3

Tenement Houses.—The condition of these houses is generally good, and a great improvement upon that in which I found them when I took charge of the district.

Cellars and Basements.—All basements occupied as dwellings in this district comply with the requirements of the law.

Privies.—Upon this subject I would respectfully refer you to my special report on privies, dated December 1, 1871.

Manure and Manure Vaults.—During the past year stable manure has been regularly removed from the great majority of the various stables in my district. A large number of manure vaults have been constructed in the yards of private stables, and also drains connecting with these vaults; but no attention seems to be paid to the ordinance limiting the removal of manure within certain hours.

Streets.—Notwithstanding the bad paving, the streets have been kept fairly clean up to the commencement of the winter. A satisfactory sanitary condition of the district cannot be arrived at until the following streets are properly paved: First avenue, from Fourteenth to Twenty-sixth street, and the cross streets from Second avenue to the East river, namely—Fifteenth, Sixteenth, Nineteenth, Twentieth, Twenty-first, Twenty-second, Twenty-third, Twenty-fourth, and Twenty-fifth streets. Filthy streets have a decidedly demoralizing effect upon the inhabitants of tenement houses, and their whole surroundings are affected thereby.

Contagious Diseases.—Taking into account the number and character of the population, the proportionate amount of these diseases has been small.

Garbage, etc.—The emptying of slops and garbage in the yards and various parts of tenement houses can only be obviated by having a responsible housekeeper in each tenement and by well-paved streets.

Respectfully submitted.

PHILIP O'HANLON, M.D.,
Health Inspector.

FIFTEENTH SANITARY INSPECTION DISTRICT.

INSPECTOR CHARLES F. ROBERTS, M.D.

NEW YORK, December 1, 1870.

DR. MOREAU MORRIS, *City Sanitary Inspector:*

SIR—I have the honor to herewith transmit to you my Annual Report of the Fifteenth Sanitary District of this city, consisting of the Twenty-first Ward, and bounded north by Fortieth street, south by Twenty-sixth street, east by East river, and west by Sixth avenue.

In the general condition of the district there is a marked improvement.

Streets and Paving.—In respect to paving, marked improvements are noticeable in some portions within the last twelve months; as, for example, the completion of the receptacle sewer on First avenue and Thirty-fourth street, and the proper paving and grading of Thirty-fourth street, from Third avenue to the river. Thirty-first street, from Second avenue to the river, and First avenue, from Thirty-fifth to Twenty-sixth street, are, in fact, the only portions of the district in which the general health is injured by the lack of proper grading.

Sewers.—The sewerage of the entire district is in very good condition, owing to the topography of this portion of the city, the surface representing a hill-side, having its apex seventy-six feet above the level of tide water at the junction of its northern and western boundaries, and gradually sloping to the river's edge, thus presenting excellent opportunities for drainage.

Privies.—I would respectfully offer, as my experience, that in houses known as private dwellings (that is, occupied by not more than three families) the water-closet is the most desirable; but in all tenement houses the privy-vault should be used. The basin required by the regulations of the Croton Board is undoubtedly theoretically good, but I never yet have seen any so constructed that practically worked well. That the gradually accumulated deposits of these vaults should be flushed by rain-water, thrown into them in great volumes during rain-storms, giving rise to offensive odors, and to many other prejudicial influences, is a grave mistake.

The "school sink" is, in my opinion, far less offensive than any other vault. This form of privy, however, requires the attention of some competent person. Where, for want of a proper housekeeper, the school-house sink cannot be used, I prefer the old-fashioned privy-vaults, disinfected when necessary, and emptied when the contents rise to within three feet of the top of the vault proper. Indeed I consider them as preferable to the sewer-connected vault, improperly flushed, as they exist in nine cases out of ten of the vaults throughout the city.

Tenement Houses.—The general condition of the tenement houses throughout the district is very good, and they are kept in a fair state of cleanliness. The ventilation of the sleeping apartments and the halls of these houses has been so thoroughly enforced by the Board of Health in former years as to call for but few complaints on my part in this respect.

SUMMARY

The following is a summary of the inspections and reinspections made by me during the last twelve months:

Tenement houses	1,038
Private dwellings	173
Stables	95
Privies	73
Gutters	47
Vacant lots	12
Cellars and basements	7
Total	1,445

Cases of contagious diseases visited and reported:

Relapsing fever	419
Typhoid	93
Typhus	6
Yellow	12
Small-pox	244
Total	774

Complaints forwarded to the Board for action :

Tenement houses	159
Private dwellings	18
Stables	84
Privies	19
Gutters	11
Vacant lots	8
Cellars and basements	7
Total	125

All of which is respectfully submitted.

CHARLES F. ROBERTS, M.D.,
Health Inspector.

SIXTEENTH SANITARY INSPECTION DISTRICT.

ASSISTANT INSPECTOR J. FITZGERALD O'CONOR, M.D.

NEW YORK, April 1, 1871.

MOREAU MORRIS, M.D., *City Sanitary Inspector:*

SIR—I have the honor to present this report of my labors as Assistant Inspector in the Health Department of this city, from the first day of June, 1870, to the first day of April, 1871.

On my appointment I was assigned to duty in the district included within the following boundaries, viz.: Fifty-ninth street on the north, Fortieth street on the south, Sixth avenue on the west, and the East river on the east. After about ten days, during which time I was mainly occupied in the management of small-pox in this district, I was transferred to that part of the city lying between Grand and East Houston streets, and from the Bowery to the East river. Still later, when the exigencies of the public service made it necessary to increase the number of inspectors, and give to each a smaller area, that part of the district from Clinton street to the East river was put in charge of another officer. The portion of this report, therefore, referring to my labors in the down-town district will apply more particularly to the remaining portion, bounded on the north by East Houston street, on the south by Grand street, on the west by the Bowery, and on the east by the East river—portions of the Tenth, Thirteenth, and Seventeenth Wards. In the first week of December last, when a redistribution of districts took place, I was again assigned to duty in the up-town district before mentioned, extending from Fortieth to Fifty-ninth street and from Sixth avenue to the East river.

The population of the down-town district is very dense, and consists principally of Germans. The keeping of small stores, saloons, petty trades and handicraft, factory work, etc., are the principal avocations. Many of the houses are of wood, particularly in Norfolk and Suffolk streets, and many of the old private houses have been converted into tenements, for which purpose they are not well adapted. The majority of the

dwellings, however (and those best suited to the wants of the population), are large brick tenement houses, of from four to six stories, and accommodating from ten to twenty families; the first floor being usually occupied by some store, saloon, or trade.

The up-town district differs from the other in being of greater area, and not so thickly inhabited, and containing some special nuisances from which the other was free; as the large dumping grounds on the East river, slaughter-houses and fat-boiling establishments, and having a considerable shanty population.

That portion from Sixth to Third avenue is occupied by large private dwellings in good sanitary condition, and calls for no extended remark. The remainder, from Third avenue to the East river, presents the characteristics of a tenement-house locality, with the exception of several fine blocks of private dwellings in various streets east of Second avenue.

Air and Sunlight.—If the Board of the Health Department of this city were required to point to accomplished results in showing a reason for its existence, the improvements which it has brought about in the ventilation of the dwellings of the poor would, if there were nothing more, be a sufficient answer. And it is not alone that the Board has ordered a window in that dark and stifling room, or a ventilating shaft in this, but the moral effect on the persons inhabiting these places must be far-reaching in its results, as it is gradually becoming plain to them that a matter about which the Board and the medical men in its service are so solicitous must be of more vital importance than they had before supposed. These people, therefore, having acquired the alphabet of a rude sanitary education, are beginning to utilize the comparatively slender advantages they already possess for introducing fresh air and sunlight into their dwellings.

There are many houses in both districts having rooms "communicating with the external air," in which the ventilation is exceedingly defective. I refer to cases where the walls of one house are built within from two to four inches of the house adjacent. They comply with the law literally, so that, as it stands at present, no remedy seems to be available.

Privies and Water-closets.—It has been wisely said that "dirt is but matter in the wrong place," and in no human concern is the truth of the saying so unmistakably evident as in the matter under consideration. Our mode of managing the bodily waste of nearly a million of human beings is certainly in need of some improvement. *First*, there is not sufficient water to properly flush the privy-vaults and water-closets, and so wash the excreta onward to the sewers. *Secondly*, when, after more or less delay, the mass reaches these sluggish veins in a state of pretty active decomposition, it gives forth its gaseous and other impalpable products to the air through frequent openings to poison the atmosphere, these openings being, by a stranger fatality, at the street crossings, where "men most do congregate." And finally, after having done all the harm possible in its transit, it is at length deposited in the waters which surround the city, where ingenious systems of wooden piers and piles and stakes seem to have been devised, further to entrap and expose its floating particles, as if to wring from it the last vile drop of physical evil which it can be made to afford.

Thus do we convert our magnificent bay into a cesspool, and our rivers into reeking sewers—for nobody supposes that contact with this volume of water can entirely neutralize the poisonous defilement of this avalanche of filth.

The six-inch pipe used for sewer connections is frequently far too small, and consequently liable to obstruction. Add to this, that the inhabitants of tenement houses are often careless or ignorant, and it being "everybody's business" to take care of the privies, nobody has the slightest concern about them; we must cease to wonder that they are often found in a bad condition.

But in many cases where the privy-vault is connected with the sewer, where the pipe is without obstruction, and a fair supply of water for flushing is provided, the condition is not satisfactory. By regulation of the Board of Works, the pipe connecting the privy-vault with the sewer is made to enter the former at a point at least two feet from the bottom, so that a residue of excrementitious matter, two feet in depth, is always present in the vault, the overflow only escaping into the sewer. At every rainstorm this mass is stirred up by the increased volume of water from the yard, or the roof leader, or both, and the air is laden with fetor. To obviate this it has been suggested to build the privy-vault entirely detached, having no water to enter it, and no connection with the sewer, and emptying it as often as seemed necessary; the waste waters from the house and the surface water from the yard only being allowed to pass into the sewer. From my own observation, I believe this mode would be preferable to the use of the ordinary privy-vault as at present constructed. There are, however, objections to either plan. The objections to the former have been stated above, and against the latter it might be urged that the constant presence of so large a quantity of excrement under the windows of a densely-populated and poorly-ventilated tenement house would be a grave evil and would need daily disinfection to make it even tolerable. It is admitted that water-closets, from their liability to get out of order, are not well adapted to the needs of tenement houses, and in the few houses in these districts in which I found them in use, they did not seem to answer their purpose well.

The contrivance known as a "school-sink" has many advantages over either closet or privy-vault. It consists of a long iron trough or tank, at one end of which is a draw-cock, giving a good supply of water, and at the other an aperture of exit, secured by a plug or stopper. When it is desired to get rid of the excrementitious mass the plug is removed, the water at the other end turned on, and the contents soon swept into the sewer. The plug is then replaced and secured, and the sink is again ready for use. The combined efficiency and simplicity of this structure would seem strongly to recommend it for use in all tenement houses.

Cellars and Basements.—I found four inhabited cellars in the down-town district which were totally unfit for human habitation. The owners of these, on my representations and without orders from the Board, caused them to be vacated and converted them to other uses. The majority of inhabited cellars and basements in both districts are in a fair sanitary condition.

Garbage.—I have never seen the order to "provide a proper receptacle for garbage" satisfactorily complied with. Refuse and garbage are still thrown into the streets, or found in all sorts of vessels along the halls and passages, and even in the bed-rooms of tenement houses. The offence of throwing garbage into the street should be punished with the utmost rigor.

Cleanliness and Posting of Names of Owners.—Much improvement has taken place in the increased cleanliness of some tenement houses, and whitewashing has been repeated

with reasonable frequency. The posting of names should be strictly enforced. Having the name of the owner without a tedious search, saves the Inspector much work and time, which he can use to better advantage in the service of the public.

Access of Inspectors.—Except in one or two cases of contagious disease, I have never had the slighest difficulty in obtaining access anywhere in the discharge of my official duties. As far as I am able to judge, the inhabitants of tenement houses regard the Inspector as a friend who does everything in his power to make their condition better. In inspecting these houses I am wont to consider myself a sort of missionary of the sanitary faith, and endeavor by short remarks and simple explanations, to impress on the people the great importance to themselves of complying with sanitary laws, and to assure them of the friendly interest which the Board of Health entertains for their condition. On subsequent reinspection I almost invariably find that seed thus sown has borne good fruit. I have found owners too (with the exception of a few speculators who always try to evade the law) generally willing to make any reasonable change for the good of their tenants, and I have been often enabled to see many improvements carried out without resorting to the usual routine of complaints, etc., through the Attorney's office and the Board room.

Stables.—There are many small stables in the down-town district, and very few of them are kept in a cleanly condition. They are mostly in the rear of tenement houses, and would be, even if kept in the best manner, objectionable in these localities. The larger stables are much better kept, usually having manure vaults, and drains to connect with the sewers. Considering the inherent unhealthfulness of stables, and the general laxity of their sanitary management, they call for a rigorous administration of the health laws; and the owners should be forced to keep them in the best condition, with tight vaults and drains, and frequent removal of manure.

Lard Melting.—There is some sort of lard-melting apparatus in almost every butcher-shop in the down-town district. These, until within the last year, consisted of open kettles from which the vapors emitted during the process of rendering escaped freely into the surrounding atmosphere, passing sometimes into the streets, and sometimes entering the rooms of adjacent dwelling houses. The persons engaged in this business were called together by the Board, and general directions were given them for making such changes in the apparatus used, as would obviate some of its most objectionable features, and notice was given that a permit should be applied for in each case. I visited the premises of all persons in my district who applied for permits pursuant to these regulations. In almost all cases the applicants were directed to construct, and fix permanently over each open kettle, a hood of zinc or galvanized iron, with hinged or sliding doors, large enough to afford room for filling, stirring the contents, emptying, etc. From this hood a pipe of the same material was to conduct the vapors generated to the nearest flue, and so to the upper air, above the level of the surrounding dwellings, or if no flue was available the pipe itself was made to run up independently to a sufficient height. These changes, insisted on in every case before recommending the granting of a permit, though entered on reluctantly at first, have met with much favor among the lard melters, who now declare with great unanimity that, besides the increase of comfort to those who are engaged in the business, the efficiency of the apparatus itself is so much enhanced that they would not now give up their hoods for ten times

their original cost. To the dwellers in the adjacent houses the change is, of course, an unmixed benefit.

Fat Boiling.—At the foot of Forty-fifth street, near the East river, two establishments of this kind on a large scale are in operation, that of "Seers Brothers & Co.," 328 East Forty-fifth street, and the "New York Butchers' Hide and Fat-Melting Association," on the block between Forty-fourth and Forty-fifth streets. This business is inherently offensive, and though contrivances for the destruction or control of the noxious gases and odors are provided, their operation is but partial and imperfect. But though much improvement has been effected, the business is still offensive and noxious, and should not be tolerated in crowded localities.

Dumping Grounds for Manure.—In relation to this matter the following extracts from a report which I had the honor of presenting on the 24th of February, contains all that need be said on the subject:

"The dumping grounds in question extend from Forty-fourth to Forty-seventh streets on the East river, and are leased by Messrs. Kane and Ryan, who are the parties in interest and carry on the business. The manure is drawn from horse stables, both public and private, but principally from the stages of the stage lines, city railroad stables, and from livery stables. According to the statement of the proprietors, half a million of loads of manure annually, or about two-thirds of the stable manure of the city, finds a temporary lodgment here, and is shipped to Long Island and New Jersey, but principally to Long Island. The average time during which each load of manure remains at the dumping ground is determined partly by the demand for it, partly (as in the past month) by the state of the ice in the rivers, and partly by the amount of fermentation which it has undergone to make it valuable as an article of merchandize. Indeed, it is this last consideration which, in my opinion, makes it so difficult to induce the owners of dumping grounds to abandon the idea of having them in the city or of shipping the manure to its destination immediately. Much of the manure, as it is carted from the stables, is almost useless for purposes of agriculture, but being left for some time to ferment in large heaps, its fertilizing qualities become developed, and it is very probable that it is never shipped from the grounds in question until after it has undergone this process. The vast majority of the citizens of this vicinity complain loudly of these grounds, some asserting that they can smell the effluvia arising from them as far to the west as the Third avenue. For my part, I have no doubt whatever that they are detrimental to health, and that it is a danger to the community that a business so noxious should be conducted in the built-up parts of the city. This district has lately obtained an unenviable notoriety for the number of cases of contagious disease, chiefly small-pox, occurring within its limits. Though it is yet a moot point whether any case of disease is directly *originated* from stables or dumping grounds, I think there can be little doubt that such influences lower the tone of the human system, and make it afford a better soil for the lodgment and development of epidemic diseases. In view of these facts it is to be desired that measures could be speedily taken to have the manure of the city removed in such a manner as would obviate the necessity of allowing it to rot in large heaps in the vicinity of a dense population."

Streets.—Most of the streets in the down-town district have the rude cobble pavement.

When I first entered on my duties here, the streets were invariably in a very dirty condition. This was speedily remedied by the general action of the Board, under which some of the streets were cleaned as often as three times a week; though from the general roughness and bad repair of the pavements and gutters, and the culpable carelessness of the people in throwing garbage and filth from the houses, much further improvement is yet desirable. It is much to be regretted that sea-water has not been hitherto made available for cleansing streets and gutters.

Housekeepers in Tenement Houses.—An amendment to the tenement-house law, providing for local supervision of tenement houses by competent and responsible persons, would effect more for the permanent improvement of these dwellings, and the habits of the people living in them, than any other measure that could be suggested. In sanitary reform it is essential that we should reach the people themselves, and in some manner induce good sanitary *habits*. This can be done only in an indirect manner at present, by the occasional visits and teachings of the inspector; and, meanwhile, from one visit to another, made by that officer, the people act at about the level of their knowledge and intelligence. It is needless to remark that in the class under consideration these qualities are not of the highest order, and hence the urgent need of some person whose business it shall be to supervise the sanitary condition of these houses. The housekeeper should keep on hand, at the expense of the landlord, a stock of disinfectants, and it should be her duty, when called upon, to furnish evidence of the use of these in such a manner as may be desirable. The absence of foul smells from privies and water-closets should not contraindicate the use of these substances. They should be used in tenement-house districts, whether offensive odors are present or not, first as a prophylactic measure, and second, because the germs of disease may be present without announcing themselves to the senses in any way.

The influence and example of a number of persons of this sort so engaged cannot be over-estimated.

Contagious Diseases.—A large portion of service rendered has consisted of attendance to cases of contagious disease, which prevailed very extensively, especially small-pox.

In relation to this disease, I may briefly state that the grouping of the large number of cases which occurred in the Nineteenth Ward, on the parallels of Blackwell's Island, where the Small-pox Hospital is situated—while the rest of the city was exempt from any *unusual* visitation—is a point of much significance; the more so, as there does not exist any peculiar condition in the district which could account for the great prevalence of the disease there. On one or two occasions it was discovered that clothing and other fomites were brought from the Island, and the influence of the open-boat ferry used by the attending physicians of Charity Hospital is also to be noted; and I am forced to the conclusion that proximity to the Small-pox Hospital (apart from direct communication with persons sick of the disease there) must be regarded as a prime factor in its causation.

SUMMARY.

Inspections and Reinspections.

CLASS.	NUMBER.	CAUSES OF COMPLAINT.
Tenement houses	841	184
Private dwellings	517	31
Cellars and basements	535	5
Privies and water-closets	670	94
Gutter and curb	207	3
Alleys	12	4
Sewers and drains	7	2
Markets	31	3
Slaughter-houses	55	6
Fat-boiling and rendering	56	8
Saloons and restaurants	35	5
Factories and workshops	41	7
Dumping grounds for manure	2	2
Storehouses and warehouses	12	3
Vacant lots	54	10
Stables	468	151
Breweries	2	....
Public buildings	13	....
Total	3,558	508

CASES OF CONTAGIOUS DISEASE.

Small-pox	153
Relapsing fever	8
Scarlatina	31
Measles	19
Diphtheria	18
Varicella	12
Vaccinations	472
Total	708

Respectfully submitted,

J. FITZGERALD O'CONOR, M.D.,
Assistant Health Inspector.

SEVENTEENTH SANITARY INSPECTION DISTRICT.

INSPECTOR AUGUSTUS VIELE, M.D.

MORRAU MORRIS, M.D., *City Sanitary Inspector:*

SIR.—I have the honor of submitting as follows the annual report of the sanitary condition of the district under my immediate supervision, being the area bounded by Fifty-ninth street on the south, One Hundred and Tenth street on the north, extending from the Park to the East River.

Topography.—The district is peculiar in regard to its topography, being a series of elevated ridges divided by deep valleys of drainage, which have never been properly cared for or protected. The principal sanitary features which develop themselves are the result of progressive city improvements, complicated by a want of proper drainage, by the filling of low places with improper material, and by the opening of new ground for building purposes.

About one-third of this district is built upon, and about one-half of the remainder is undergoing changes with reference to the construction of buildings. The residue is undisturbed and unoccupied, except by occasional shanties and stables.

About one-half of the built portion is occupied by tenement houses or with stores having tenement rooms above them, most of which are of the better class, the remainder being for the most part first-class private dwellings, many of them of very superior construction, especially those adjacent to the Park. There is one peculiarity with regard to this district deserving of notice, and that is the large number of public institutions, hospitals and homes for the indigent and needy which are located within its limits. It is, perhaps, more particularly in connection with the fact that this locality has been thus selected for so many charitable institutions, that I should reiterate what I have referred to in former reports, the great and imperative necessity for a more systematic and more thorough attention to the subject of proper drainage, especially in regard to the "old water courses." They should be kept free from obstruction, and maintained in each case until their contents can be discharged into a sewer. In confirmation of the views above expressed in reference to the necessity of proper care of these streams, I may cite the condition of the locality in the vicinity of Avenue A, between Seventy-fourth and Seventy-sixth streets, where intermittents have heretofore prevailed to an alarming extent, but upon the recommendation of the Health Department, sewers were constructed in Avenue A, Seventy-fifth and Seventy-sixth streets, thus effectually draining this section and providing protection for two old water courses. The result is already manifest from the fact that there is not a case of intermittent fever in the immediate neighborhood. There should be no filling of squares to hide or conceal them, but allow a free flow for them in their "original bed." Unless this is done, these institutions must inevitably become permanent sources of disease.

A sick person could hardly be expected to get well in a place where a well person would be almost sure to get sick. And unless these drainage streams are properly provided for and protected, and unless the filling in of sunken lots and streets with garbage

and refuse material is abandoned, the buildings which are erected in such localities must become permanent abodes of disease. After the buildings are erected the remedy is too late, the evil is accomplished. It would seem to be an especial duty for the Board of Health to give a close sanitary supervision to all of the improvements which are in progress or in contemplation in a district where so many charitable and benevolent institutions are in operation, not only in regard to the general character of the improvements with reference to the drainage and the proper condition of the soil, but to the internal arrangement of the buildings so occupied. There seems to exist even among intelligent architects a great want of information on the subject of ventilation and the proper amount of pure air necessary to healthy respiration, and I would suggest the propriety of all plans for buildings of this kind being submitted to the Board of Health for examination previous to their erection, with the view of securing in the original construction of any building of this character a proper amount of ventilation. It will at once be perceived that this being accomplished, a large number of sanitary evils are permanently prevented.

Sewerage.—The sanitary condition of this district has been very much improved during the past year by the construction of several sewers in streets and localities where they have been recommended by the Department of Health as sanitary necessities.

Streets.—Many streets have been paved during the year, adding much to the cleanliness of certain portions.

Drainage.—Some few squares of sunken and low ground have been drained and filled. Yet much remains to be done in this respect.

I deem it worthy of notice to state in this connection, that there are in process of construction twenty buildings, upon a square that two years ago contained ten feet of stagnant water, which could not have been improved unless the Board of Health had exerted their power, and had them properly drained and filled.

The winter rains and snow have contributed greatly to the accumulation of water in the squares west of Third avenue, between Seventy-fourth and Seventy-sixth streets, and the heat of midsummer must inevitably develop a large amount of sickness in this section, unless prompt and energetic measures be taken to have this large body of water removed, and the surface filled with fresh earth.

It is an exceedingly difficult matter to maintain a proper degree of sanitary supervision over the denizens of the shanties and hovels which are scattered over the otherwise vacant portion of the district, there is such a promiscuous mingling of men, women, and children, with the cattle, dogs, goats, and fowls, all contributing to the common collection of filth, that it is almost impossible to keep them in semblance of decency. Few suggestions are heeded by the occupants, and still it appears to be of vital importance to the welfare of the families, that a strict sanitary law should be enforced amongst them.

Tenement Houses in this district are of the better sort, of rather recent construction, and built with a due regard for the well-being of the occupants, and in conformity with the tenement-house law. A great many are occupied in suits, with only one family on a floor, thus securing perfect through and through ventilation for each. Many are of class styled double tenements, with hall in the centre of the house, each floor with two families.

It is pleasing to record as a fact, the willingness upon the part of the owners to comply with the requirements of the Health Department in all necessary alterations and improvements. And I think it can be justly said that the district contains some of the most perfect tenement houses in the city, with *model privies* and sewerage.

Slaughter Houses and Fat Melting.—This district contains only one slaughter house, and one fat-rendering establishment. As I was at one time assigned to duty for a short period in a district where they were located, it may be proper to allude to the management and cleanliness of these "necessary evils" in a large city. It can be safely said, that they are generally conducted with a regard for cleanliness—floors are washed daily; yards are paved, and cleaned daily; and, with few exceptions, due attention is paid to all the restrictions and ordinances of the Health Department. Frequent inspections have a salutary influence.

I am of the opinion that all establishments of this nature should be concentrated at one point or section, instead of being scattered over so many different portions of the city, as at present—one large and grand "abattoir," with all the necessary appliances for the accommodation of the separate branches pertaining to the slaughtering of animals and rendering of fat.

Contagious Diseases.—It is gratifying to record the prompt and successful arrest of the prevalence of small-pox last spring, by the course adopted by the City Sanitary Inspector in having all cases removed to the hospital. I believe my own district was the first in which compulsion and the aid of the police were necessary, being followed up in other districts. The public soon learned to acquiesce and recognize the authority, and acknowledge the justice and necessity of the course adopted. Within four weeks the disease, which had prevailed for a year, was entirely arrested; scarcely a case was reported. The beneficial results of the course pursued speak volumes in behalf of the foresight and judgment in inaugurating a policy so just and salutary in its execution.

My own experience has convinced me of the impossibility of isolating a case of small-pox in a tenement house, and the uncertainty of isolation in a private house. During the months of January, February, March, and April, I visited 146 cases of small-pox; while for July, August, September, October and November, only ten cases; the decrease attributable mainly to the energy of the Health Department in carrying out the policy inaugurated in the outset, of removing all cases to the hospital that could not be isolated.

Since the reappearance of the disease in December, and its prevalence through the winter, there has been observed an unusual susceptibility to the influence of vaccination in cases of revaccinated persons. A much larger proportion have been found successful than at any former period, confirming the judicious course adopted by the Health Department in their efforts to prevent the extension of small-pox, by vaccinating and revaccinating all who are willing to accept the proffered boon; although it is found difficult to convince many persons of the necessity of revaccination, and in several instances, where it has been refused, the persons refusing have taken the small-pox.

Tabulated Statement of the Inspections and Reinspections and Complaints made during the Year.

	INSPECTIONS AND REINSPECTIONS.	REPORTS AND COMPLAINTS.
Tenement houses	1,169	185
Private dwellings	743	86
Other dwellings	287	42
Cellars and basements	36	3
Public buildings	44	8
Stores and warehouses	60	7
Factories and workshops	104	34
Fat and lard rendering	46	8
Slaughter houses	109	21
Stables	745	110
Other buildings	43	7
Privies and water-closets	234	76
Sunken lots	654	133
Streets and gutters	115	38
Drains and sewers	46	27
Breweries and malt houses	26	.....
Total	4,461	785

CONTAGIOUS DISEASES.

Small-pox	163
Scarlatina	49
Typhoid fever	6
Relapsing fever	29
Vaccinations	292
Total	538

Most respectfully submitted.

AUGUSTUS VIELE, M.D.,
Health Inspector.

April 1, 1871.

EIGHTEENTH SANITARY INSPECTION DISTRICT.

ASSISTANT INSPECTOR ROGER S. TRACY, M.D.

To DR. MOREAU MORRIS, *City Sanitary Inspector.*

SIR—I have the honor herewith to present my report of the condition of my inspection district, and of the work done by me since December 1, 1871.

The district comprises that portion of the city lying between Sixth avenue and One Hundred and Tenth street and Harlem River, and the greater part of the space thus bounded is not yet very thickly settled. The western portion, below one Hundred and Twenty-fourth street, is mainly occupied by the shanties of squatters, and is very little improved. The immediate vicinity of Third avenue, on the other hand, is densely populated.

Vacant Lots, Ashes, and Garbage.—I wish to say a few words upon the condition of vacant lots, and of ashes and garbage in the streets. The greater portion of Harlem consists of vacant lots, and upon the east side of Third avenue they are almost all more or less sunken below the level of the adjacent streets. Many evils result from this condition of things, the most immediately obvious of which is, the accumulation of water and filth of all kinds in these quasi-reservoirs, and the formation of stagnant pools, which remain until the soil beneath has soaked them up, or, where the rock prevents this, until they have evaporated. In either case they must necessarily be productive of miasmata, injurious to the health of the neighboring inhabitants, and particularly are undoubted sources of malaria. But another evil has been brought to my notice by the complaints of citizens. It is that where a vacant lot, below the street grade, adjoins a house, the water accumulations often force a way through the basement wall of the house into the cellar, flooding the cellar, in one case I have seen, to the depth of six or eight inches. In many of these sunken lots, too, the rush of water, during a heavy rain, down the sides of the lots, has gullied away the soft earth so as to undermine the pavement of the sidewalks, and leave some of the stones sunken down, and some partially turned on edge, so as to afford serious and perhaps, in some cases, dangerous obstacles to a passenger on a dark night.

The system of collecting the refuse from houses is either very defective or is poorly carried out in Harlem. In front of great numbers of houses, both tenement and private, are to be seen large piles of ashes and garbage, mingled with rubbish, which are not only eyesores in an æsthetic point of view, but which are offensive to the smell, and cannot be considered otherwise than as sources of miasm. I have been, in many places, informed that the ash-man never came round, and in others, that he did not remove the accumulations thoroughly. Be that as it may, these piles of fermenting, decaying vegetable matter, mingled with other filth, exist all over Harlem, but more especially on the east side of Third avenue.

Contagious Diseases.—This district has not been very much affected by the epidemic of variola, which has spread so generally throughout the city.

Stables.—I do not feel as if it were possible to use terms too strong in expressing my

firm conviction that no cow-stable should be allowed within the city limits. I do not believe it is possible to keep healthy stall-fed cows.

The inhabitants of my district, with few exceptions, seem willing and cheerful in complying with the orders of the Board of Health, and prompt to avail themselves of its assistance in the abatement of nuisances.

The following is a statement of the work done by me, from October 8, 1870, to April 1, 1871, while on duty in the district extending from Fortieth street to Fifty-ninth, and from Sixth avenue to the East river.

	October 10 to December 1, 1870.		December 1, 1870, to April 1, 1871.	
	No. of Inspect'ns.	No. of Complaints	No. of Inspect'ns.	No. of Complaints
Tenement houses	315	36	76	34
Private houses	12	3	30	4
Other dwellings	12	.....	.....	.....
Cellars and basements	.....	.....	2	1
Privies	7	2	1	.....
Vacant lots	11	2	7	3
Stables	2	1	287	8
Factories	3	1	6	1
Public Buildings	.....	.....	1	.....
Slaughter houses	3	.....	.....	.....
Total	365	45	410	51
CONTAGIOUS DISEASES.				
Variola	1	1	5	5
Varioloid	.....	.....	6	6
Varicella	.....	.....	1	1
Scarlatina	.....	.....	2	2
Typhoid fever	.....	.....	3	3
Relapsing fever	1	1	.....	.....
Total contagious diseases	2	2	17	17
Total inspections	367	47	427	68

I was upon duty in this district for too short a period to become well acquainted with its sanitary condition.

Respectfully submitted.

ROGER S. TRACY, M.D.,
Assistant Inspector.

"B."

REPORT

OF THE

SANITARY PERMIT INSPECTOR.

HEALTH DEPARTMENT, CITY OF NEW YORK,
SANITARY PERMIT BUREAU,
NEW YORK, April 10, 1871.

To the Secretary of the Board of Health of the Health Department of the City of New York:

I have the honor to submit the following report of the duties performed by the officers and employés of the Health Department under my direction, with such other statistical information as may be considered of value in respect to the recently organized Bureau of Permits. I was appointed Sanitary Permit Inspector on the 30th May, 1870. On the 29th June the Board approved of a list of instructions directing under what sections of the Code I should proceed, requiring weekly reports to be made, specifying the amount of labor performed, also to cause an examination to be made after permits had been granted, to ascertain whether the business, matter, or thing, for which a permit had been granted, is being conducted in accordance with the conditions specified in such permit, all of which has received careful attention.

The number of permits issued (698) which were approved by the Board are as follows:

To keep cows (total number of cows to be kept)	976
To " geese " geese "	22
To " horses " horses "	16
To " swine " swine "	85
To " goats " goats "	23
To " poultry	8
To slaughter animals	19
To " sheep and calves	10
To " hogs	5
To " cattle until December 1, 1870	3
To kill and dress poultry	3
To render fresh lard	88
To occupy basement	264
To cart swill	28
To blast rocks	5
To maintain slaughter-house	1
To " dumping ground	3
To salt hides and receive fat	1
To clean and dry beef bladders	1
To tan goat-skins	1
To manufacture sausages	2
To sell poultry and vegetables	2
To cart bones	1
To receive and weigh fresh hide	3
To cufe tripe and pigs' feet	5
To cure hides	1
To salt and smoke beef and pork	1
To sell pork	1
To melt fat	1
To collect fat	2
To sell fish and oysters	2
To sell meat	1
To strip beef heads	3
To make oils	1
To refine gold and silver	1
To manufacture tobacco	1
To manufacture soap	1
To store and sort woollen rags	1
To galvanise iron and tin	1
To build privy-vault	1
To use shooting-gallery	1
To manufacture shell lime	1
To conduct business of stair-building	1
To maintain smoke-houses	1
To collect and remove dry bones	1
To strip and dress beef heads	2

Number of notices sent (272), where the application for a permit has been denied, is as follows:

To occupy basement	60
To keep cows (total number of cows to be kept)	333
To " fowls " fowls "	3
To " swine " swine "	3
To " cows " cows "	4
To " goats " goats "	6
To " geese " geese "	8
To keep horses and cows	1
To keep poultry	4
To keep chickens (total number of chickens to be kept)	25
To render lard	59
To " tallow and slaughter cattle	1
To make sausages	4
To manufacture soap	1
To boil and clean tripe	5
To remove bones	1
To clean and boil tongues	1
To boil tripe and pigs' feet	2
To run engine, using shavings and turnings	1
To render butcher's fat	1
To melt hotel slush	2
To dyeing and preparing goat-skins	1
To cart swill	1
To yard chickens	1
To collect and pick heads	1
To collect bones	3
To prepare tripe	1
To clean cattle heads	2
To keep pigs	45
To slaughter sheep and calves	3
To " animals	3
To " cattle	4
To prepare tripe and pigs' feet	1
To receive and store fat and hides	1
To dump manure	1
To maintain a foundry without a smoke consumer	2
To collect rags and bones	14
To manufacture gas-pipe	1

Notices sent by the Sanitary Police had in all cases been promptly delivered. In many cases where the permits have been denied, the Board has, on a second application, granted the same, the objections which existed having been removed. In many cases, however, where the permits have been denied a second time, as, per example, "To occupy basements," the trouble chiefly lies in the failure of the party making the application to comply with the requirements of the Code, and make such alterations as suggested by the Inspector. The largest

number of applications denied are those for keeping cows. The grounds principally upon which the Board refuses to grant a permit in such cases are the filthy condition of the stables in which such cows are kept, the absence of sewer connection, and the complaints of the neighbors in the vicinity of the same.

I have caused to be examined by Inspector E. L. Bullock (assigned to my Department), one hundred and fifty places where permits have been granted in addition to those examined by myself, and have found as a general rule that the persons receiving the same fully comply with all the requirements of the Code. Where permits have been denied, I have found that, instead of the persons discontinuing their business after such denial by the Board and notification by me, they still continue the same, probably with the hope of receiving their permit at some future day. I have forwarded to the Board the names of these persons who thus defy the law. The regular weekly communication, from time to time, gives the names of persons continuing business after being notified to discontinue the same.

Immediately upon the receipt of my weekly communication from the Board, I send to all persons, whether the permit has been granted or denied, a notice of the same, but very frequently I am compelled to send a second notice, for the reason that after permits have been granted many think that the mere notice from this office of the fact is sufficient, and that they are not compelled to call and obtain the same. Of the large number of permits granted by the Board not more than twelve have failed to obtain the same, and three of these are for persons who reside out of the city.

In the registers, kept for that purpose, are entered the names of persons, whether the permits have been granted or denied.

The following is the plan of the register where permits have been granted:

REGISTER OF PERMITS—HEALTH DEPARTMENT OF THE CITY OF NEW YORK.

Number.	Name.	Place.	Thing permitted.	Date of application.	No. of application.	Granted.	Revoked.	Date of receipt from Board.	Date when issued.	To whom given.	To remain in force.	Remarks.
1	John Smith.	313 E. 20th st.	Render lard.	April 13.	1	June 29.	..	June 30.	July 1.	John Smith.	.....	..

REGISTER OF APPLICATION FOR PERMITS NOT GRANTED—HEALTH DEPARTMENT.

Number.	Name.	Place.	What applied for.	Date of application.	No. of application.	When received from Board.	When denied.	Why denied.	Remarks.
1	Adams, A...	121 West 20th st..	Occupy basement	June 28.	1	June 29	June 28	Badly ventilated..	..

The applications are in all cases numbered so as to agree with the number on the register, and are properly filed. Any information called for from time to time can be readily given. In the register for permits denied are entered the name of applicant, reason for denial, and the application filed as in case of permits granted.

The following is the form of permit used by this Bureau:

No. Date 187 . Person permitted Place Thing permitted Time permit to be in force	No. HEALTH DEPARTMENT OF THE CITY OF NEW YORK, SANITARY PERMIT BUREAU, No. 301 Mott street, New York, 187 . Pursuant to a resolution of the Board of Health of the Health Department of the City of New York, permission is granted to subject to the provisions of the Sanitary Code. This permit to be in force days from its date unless sooner revoked by the Board. By order of the Board, *Sanitary Permit Inspector.*

Notwithstanding this is a newly organized Bureau, and that much time was necessarily consumed in the preparation of books and blanks, yet a large amount of labor has been performed, and with a few alterations in blanks, which the increase of labor has necessitated, the Bureau is in good working order.

Respectfully submitted,

C. H. COOPER,
Sanitary Permit Inspector.

"C."

REPORT

OF THE

INSPECTOR OF STREET CLEANING.

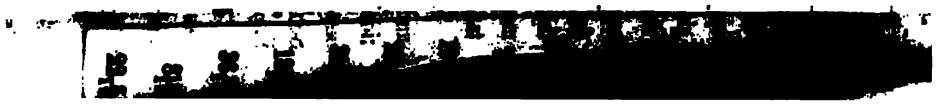
BUREAU OF STREET CLEANING,
HEALTH DEPARTMENT OF THE CITY OF NEW YORK,
301 MOTT STREET, March 1, 1871.

To the Board of Health,
COL. EMMONS CLARK, *Secretary:*

GENTLEMEN—In conformity with a requirement of the Department, I have the honor to submit my report of the proceedings of this Bureau.

It was organized on the first of June, 1870. The office being a new one, without precedents for its guidance, regulations suggested by the Street Cleaning Committee were adopted for its government, and a correspondence opened with different European cities to obtain information relative to the systems in operation for maintaining cleanliness in their streets. For the purpose of ascertaining with certainty the amount and character of work done and the necessity for additional street cleaning, delinquency of contractor, etc., four assistant inspectors were appointed by your Honorable Body on the 22d of June, and six additional on the 5th of July.

To each of them was allotted a district, a map of which was prepared to designate, in appropriate colors, the number of times each street or part of street was required to be swept, under the original contract between the municipal authorities and the Street Cleaning



, as well as under special requisition of the Board. Ac-
g these maps were instructions to report, daily, streets swept,
tted, ashes and garbage not removed, dirt left after sweep-
ion of streets, imperfect cleaning, either from negligence,
d pavement, or obstructions, etc. Police officers and fore-
e Street Cleaning Contractor furnish, weekly, similar reports.
its made to the Bureau are entertained and remedied by it
acticable; otherwise they are referred for the consideration
on of the Board. The original contract for cleaning the paved
of the city, not being sufficiently comprehensive to meet the
demands, the City Sanitary Inspector recommended as a hy-
measure, extra cleaning of one hundred and forty miles per
which, by authority of the Board, the Street Cleaning Committee
sted with John L. Brown to execute at the rate of thirty-five
per mile for streets cleaned three times and less per week, and
dollars per mile for those cleaned more than three times, com-
ng on the 22d of June, and extending to the 30th of July. De-
n annexed schedule, marked "A."

is was continued, with one hundred and eight miles additional
r requisition of August 12. Details in Schedule B. Twelve addi-
al miles were added August 26. Details in Schedule C. Sixty-one
hundred and ninetieths parts of a mile, September 10. Details in
edule D. Half of a mile under requisition of October 1. Schedule

The magnitude of the undertaking to maintain cleanliness in a
t city like New York is imperfectly appreciated, and consequently
le to misconception and misrepresentation in regard to the accom-
ment of details, which alone obtrude themselves upon the casual
rver. It is a misfortune that the densely populated tenement-
e districts should be badly paved, as it affords an excuse to the
izens for throwing into the streets, house refuse, garbage, and filth,
nsive to the senses, and when permitted to remain and undergo
nacausis, becomes, in the estimation of hygienists, a fruitful source
isease, liable to extend its influence beyond the immediate limits
ts origin.

he Sanitary Code has provided against nuisances of this kind, but
t difficulty is experienced in enforcing the ordinances from various
es.

There have been spared by this Bureau no efforts to insure compliance with the street cleaning-contracts and the ordinances of the Board, and I have the gratification to report favorable results, evidenced not only in the improved aspect of the streets, but in a willingness on the part of the public to observe sanitary regulations and to recognize the hygienic necessity for them. The appearance of unusual cleanliness in the city has been the subject of general remark, and has induced neighboring cities to ask information relative to the measures instituted for its consummation. I have had the gratification of replying that it was due to the execution of efficient ordinances enacted by the Health Department. An urgent necessity exists for a more definite obligation to keep the narrow streets in the lower part of the city free from accumulations of snow, especially in those upon which have been constructed railroad tracks. These tracks are cleaned by throwing the snow on either side of the street, and when to it is added the snow from the sidewalks, the accumulation offers a serious obstacle to the collection of refuse from the houses by impeding the access of garbage carts; consequently an excuse is offered for throwing broadcast over the snow-heaps what would otherwise be immediately taken away—offensive to the sight in winter, and detrimental to the health afterwards.

In sections of the city paved with cobble-stones there exist great inequalities in the pavement, furnishing reservoirs for the accumulation of filth and water to stagnate, rendering satisfactory street-cleaning entirely out of the question, of which denizens in tenement houses in these localities take advantage and increase the difficulty by invariably discharging their filth and garbage into the low places.

The legislature having authorized the municipal government to have the streets cleaned, an agreement was entered into with the Street Cleaning Association to clean all the paved streets, avenues, lanes, alleys, gutters, wharves, piers, and slip-heads in the city of New York once every week; Broadway every twenty-four hours to Twenty-sixth street; Park row, Chatham, Bowery, and Broadway, from Twenty-sixth street to Fifty-ninth street, three times a week; Fourth avenue to Thirty-second street, Eighth avenue to Forty-second street, State, Whitehall, Wall, Cortlandt, Fulton, and Chambers west of Broadway, Maiden Lane, Grand east of Broadway, and Canal west of Broadway, twice a week, in and for the consideration of $498,500.00 per annum; 243 miles

once, 17⅜ twice, 17½ three times, and 17½ every night. Total, 295⅛ per week.

The inadequacy of this to meet the sanitary demands necessitated the additional cleaning ordered by the Board in accordance with an act of the legislature, and upon the recomendation of the City Sanitary Inspector. The work being ordered at a stipulated price per mile, it devolved upon me to make an accurate admeasurement of the streets and parts of streets, to be able to verify the accounts for the work prior to submission to the committee for approval, consequently each street and place have been measured with as much exactitude as possible, and the details given in annexed schedules.

Total, 597⅛ miles weekly.

The remarkable freedom from filth and dirt observed during the past summer in sections of the city heretofore noted for a want of cleanliness, is adduced as irrefragable evidence of the judicious disposition of the money expended for extra street cleaning, of the faithful execution of the work under the contracts, and a presage of what may be accomplished for the public weal under the same auspices.

Very respectfully,

Your obedient servant,

THOMAS COTTMAN,

Inspector of Street Cleaning.

"D."

REPORT ON VITAL STATISTICS.

BUREAU OF RECORDS OF VITAL STATISTICS,
April 1, 1871.

Col. EMMONS CLARK,

Secretary of the Board of the Health Department:

SIR—I have the honor to submit the following report upon the Vital Statistics of the year 1870.

I assumed direction of this Bureau on June 1, 1870. Its operations since that date have been conducted upon the same general plan as had been pursued previously, a few changes having been made in details and in the method of recording mortality. The system in vogue is described in the report of Dr. John T. Nagle, Deputy Reg'r of Records. To his constant co-operation, and to the attention and efficiency of the gentlemen acting as clerks, I am indebted for the perfect manner in which the somewhat intricate machinery of the Bureau has been managed; and I take this opportunity of returning them my most grateful acknowledgments for their services.

The assignment to the Bureau of another medical gentleman besides myself as my co-laborer has proven not only a very judicious measure in itself, but a peculiarly fortunate one in securing so able and competent an officer. An adequate and intelligent surveillance has thus been insured over that most important branch of duty, viz.: the inspection and acceptance or rejection of certificates of death. None other than a mind properly disciplined by medical training can possess the judgment essential to the prompt determination of the numerous medical and medico-legal questions arising in connection with these returns. To send back a physician's certificate for correction or supplementary information is a matter of some delicacy, liable to be construed as im-

pertinence by those who fail to appreciate the motive for the proceeding. Our interrogations, however, now seldom fail to elicit from respectable physicians all the points desired. In furtherance also of our statistical interests, the new issue of certificates of death has printed upon the back of each a list of those diseases whose definition upon certificates our experience has proven to have been the most unsatisfactory, each disease upon said list having stated opposite to it the information required. This expedient has been attended with the most favorable results.

The deductions obtained from statistics of mortality must derive all their value from the proper classification of diseases, and the significance of that classification is entirely dependent upon the accuracy of information supplied by death certificates. This is constantly becoming more apparent to the profession, who, in acknowledging the importance of such aggregations of facts to the science of medicine, must also perceive that every individual contribution to vital statistics is, in its ultimate value, as so much "bread cast upon the waters," to be "returned after many days."

CHANGE IN THE SYSTEM OF RECORDING MORTALITY.

Up to July 1st, 1870, the method of recording weekly mortality in this Bureau had been imperfect, and perhaps essentially so, principally on account of deaths in the public institutions having been returned so tardily as to render practically impossible any attempt at determining actual mortality within a reasonable period. Upon submitting this irregularity to the Commissioners of Charities and Correction the evil was immediately rectified, and death certificates from the hospitals under their direction have since been forwarded, as a rule, with promptitude.

The weekly mortuary statistics, previous to the date mentioned, had been founded simply upon the number of deaths *registered* during any one week, or in other words, upon the number of certificates of death received between noon of one Saturday and noon of the next. This figure obviously did not represent the *true* mortality, although usually closely approximating it in the aggregate, and sufficiently so in the case of individual groups of diseases for purposes of public utility. In a scientific sense, however, it was deficient, particularly as regards those

affections whose fluctuations are recognized as being constantly modified by or coincident with certain meteorological phenomena.

In conformity with these principles the necessary change was effected, although its accomplishment was attended with considerable difficulty. Two accounts are now kept—one of *registered* deaths for each week, closed on Saturday at noon, and reported in detail for the information of the Board; another, completed about a week later, comprises the *actual* weekly mortality, and will hereafter form the basis for the annual report.

A printed statement also is compiled weekly for limited distribution, being sent principally to Health Departments of American and Foreign cities, and to the Medical Associations and Journals of New York. This includes the actual daily mortality, the most prominent causes of death, and the meteorological observations for identical days of one week, together with the registered mortality of the subsequent week. The importance of this systematic record of daily necrology and meteorology will become more apparent as its figures gradually accumulate from year to year.

The relations between atmospheric alternations and the manifold operations of disease can be positively determined only by direct comparison. That they are not hypothetical, but exist to a far greater extent than human observation can yet estimate, few are now disposed to deny. Dr. James Stark remarks, with regard to atmospheric changes, that between them and mortality there exists "the closest possible connection," and that their "deleterious effects may be traced from week to week and even from day to day." As each meteorological condition is assuredly modified by all the others, and as amid this multiplicity of reciprocal and subtile processes the observer can with certainty detect a number of destructive agencies which operate periodically and unerringly upon the animal economy, it remains for him to carefully scrutinize and weigh every associate circumstance. In such a manner only can philosophy ever determine what the greatest of modern philosophers* has styled "The principles of unity that pervade the vital forces of the universe."

With these preliminary remarks, we proceed to the separate examination of each quarter of the year 1870.

* Humboldt.

Deaths in the City of New York from all causes (in Quinquennial

MONTHS.	NATIVITY.				Colored.		Under 1 year.		1	
	United States		Foreign.							
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
January	670	598	423	366	20	22	286	214	86	86
February	696	595	408	318	29	23	291	229	112	84
March	830	679	517	417	22	35	324	270	121	98
Total	2,196	1,872	1,348	1,101	71	80	901	713	319	268
Percentage of deaths in each period of life on total mortality of quarter	33.70	28.72	20.69	16.89	1.09	1.23	13.82	10.95	4.89	4.11
Total of both sexes	4,068		2,449		151		1,614		587	
Percentage of both sexes on total mortality of quarter	62.42		37.58		2.32		24.77		9.00	

MONTHS.	35		40		45		50		55	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
January	61	58	54	40	43	39	49	27	44	26
February	67	45	36	35	51	35	44	36	39	29
March	89	66	59	46	66	36	55	31	45	32
Total	217	169	149	121	160	110	148	94	128	87
Percentage of deaths in each period of life on total mortality of quarter	3.33	2.59	2.29	1.86	2.45	1.69	2.27	1.44	1.98	1.33
Total of both sexes	386		270		270		242		207	
Percentage of both sexes on total mortality of quarter	5.92		4.15		4.14		3.71		3.18	

Periods), during the thirteen weeks ending Saturday, April 2, 1870.

2		3		4		Total under 5 years.		5		10		15		20		25		30	
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
49	73	34	40	26	14	481	427	32	49	16	11	16	26	64	41	60	44	50	50
76	40	31	37	20	27	530	417	48	39	11	11	16	20	44	54	61	64	48	53
59	60	50	26	39	24	593	478	46	38	26	19	22	30	70	43	56	67	75	58
184	173	115	103	85	65	1,604	1,322	126	126	53	41	54	76	178	138	177	162	182	161
2.82	2.65	1.77	1.58	1.30	1.00	24.61	20.28	1.93	1.93	.81	.63	.83	1.16	2.73	2.12	2.72	2.48	2.79	2.47
357		218		150		2,926		252		94		130		316		339		343	
5.47		3.35		2.30		44.89		3.86		1.44		1.99		4.85		5.20		5.26	

60		65		70		75		80		85		90		95		100 and Upward.		Total by Sexes.		Total both Sexes.
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
44	34	29	25	17	24	10	24	9	11	3	6	2	....	....	1	....	1	1,093	964	2,057
39	22	27	23	16	15	13	16	8	14	4	5	2	1	....	1	....	....	1,104	913	2,017
47	38	28	36	23	32	15	24	14	11	5	8	1	3	....	....	1	....	1,347	1,096	2,443
130	94	84	84	56	71	38	64	31	36	12	19	5	4	....	2	1	1	3,544	2,973	6,517
1.99	1.44	1.44	1.29	.86	1.09	.58	.98	.48	.55	.18	.29	.08	.06	....	.03	.015	.015	54.38	45.62	100
224		178		127		102		67		31		9		2		2		6,517		.....
3.43		2.73		1.95		1.56		1.03		.47		.14		.03		.03		100		.....

FIRST OR WINTER QUARTER OF 1861—THIRTEEN WEEKS, ENDING APRIL 1.

During this quarter there were registered 3,850 births, 2,021 marriages, and 3,017 deaths, being an excess over the autumnal quarter of 1860 of 825 births and 724 deaths, and a decrease of 105 marriages.

Meteorology.

The mean temperature of January was 36.93° Fahr. (temperature will always be understood hereafter as expressed in degrees Fahrenheit—higher by 6° than that of the corresponding month for either of the ten previous years. The average temperature of January for the same period was 28.72°. Snow or rain fell upon twelve days of the month to the amount of 1.3 inches, the average rainfall of this month for the ten previous years having been 3.32 inches. The mean reading of the barometer for January was 29.925, and the mean humidity 72.57.

The mean temperature of February was 30.78°, being equivalent to the average temperature of this month for the ten previous years. Snow or rain fell upon thirteen days of the month to the amount of 4.47 inches, the average rainfall of this month for the ten previous years having been 4.06 inches. The mean reading of the barometer for February was 29.747, and the mean humidity 67.93.

The mean temperature of March was 46.33°, its average temperature for the previous ten years having been 36.73°. Rain or snow fell upon twelve days of the month to the amount of 4.17 inches, its average rainfall for the ten previous years having been 3.54 inches. The mean reading of the barometer for March was 29.76 1, and the mean humidity 52.61.

The mean temperature of the quarter was 34.42°, its average temperature for the previous ten years having been 32.23°. The maximum temperature was 58.2° on January 23, and the minimum 11° on February 22. Rain, snow, or hail fell upon thirty-seven days, the quantity amounting to 13.07 inches. The average rainfall of this quarter for the ten previous years was 11.81 inches. The mean atmospheric pressure of this quarter was 29.825, and its mean humidity 64.47.

On January 21, the barometer fell to 28.871 inches, being the lowest reading within fifteen years with one exception, viz., on February 4th, 1853, when it registered only 28.840 inches. Its highest reading was 30.497 on January 14.

Complete saturation of the atmosphere (100) occurred on January 13, and on February 1 and 6. The least degree of humidity was 25.86 on March 24.

Lightning without thunder was observed on the night of February 18.

The equinoctial storm extended through three severe successive gales from March 12 to March 27.

Mortality.

The deaths registered for the last quarter of 1869 had amounted to 5,793. That number was exceeded during the three months now under consideration by 724. The increase was very generally distributed through the whole list of diseases, but was more especially pronounced in the zymotic class, and there chiefly in the case of deaths from small-pox (201), scarlatina (418), and what had not been recognized as existing here for a number of years, viz.: relapsing fever, to which 45 deaths were now attributed.

DEATHS REGISTERED EACH WEEK, BY CLASSES, FOR THE FIRST QUARTER, ENDING APRIL 2, 1870.

CLASSES.	WEEKS.													Total each Class.
	1	2	3	4	5	6	7	8	9	10	11	12	13	
	January 1 to January 8.	January 8 to January 15.	January 15 to January 22.	January 22 to January 29.	January 29 to February 5.	February 5 to February 12.	February 12 to February 19.	February 19 to February 26.	February 26 to March 5.	March 5 to March 12.	March 12 to March 19.	March 19 to March 26.	March 26 to April 2.	
Zymotic	124	115	105	115	140	128	124	115	114	111	119	111	106	1,527
Constitutional	130	126	129	120	102	121	143	124	111	104	108	116	120	1,554
Local	238	219	175	233	215	205	204	228	226	240	206	216	225	2,830
Developmental	50	39	37	28	27	23	26	35	21	36	23	32	24	401
Violence	23	21	13	17	16	7	20	14	12	13	11	16	22	205
Total	565	520	459	513	500	484	517	516	484	504	467	491	497	6,517

The year 1869 had been distinguished by quite a severe epidemic of small-pox, which sprang up in the autumn of 1868, and gradually

attained such proportions as to require the constant attention of the Metropolitan Board of Health and its subordinates. The fact that within a month 30,000 persons were vaccinated by eighty Sanitary Inspectors and Assistant Inspectors, and 50,000 altogether between June and the end of the year, is a memorable one in the history of this epidemic in New York. Notwithstanding the protection which this immense and certainly well-executed work might have been expected to afford the community, the last quarter of 1869 had been marked by a new invasion of the disease in its more aggravated forms, breaking out suddenly in November and carrying off during the quarter 109 persons, 53 per cent. of its total yearly mortality in 1869. The Eleventh, Seventeenth, and contiguous margin of the Eighteenth Wards seemed to constitute the focus of this outbreak and to suffer in proportion; the Nineteenth Ward, which had previously yielded the highest mortality, appearing third on the list. Although no relaxation took place in the efforts of the Board and its officers to discover new cases, to have them transported to hospital, to isolate infected localities, and to continue the work of vaccination, the disease manifested a decidedly progressive tendency. During the first quarter of 1870 its ravages attained their culmination. The fatal cases registered for this period amounted to 201, being only two less than for the whole year 1869, and ten per cent. more than the average annual mortality from this affection during the present century in New York. The Eleventh, Seventeenth, Eighteenth, and Nineteenth Wards continued to furnish the most considerable quota of this mortality to the combined amount of 156 deaths, the Seventeenth and Nineteenth being in the ascendancy with 58 each. During this quarter, however, there was an evident decline in the epidemic, 79 deaths having been recorded for the four weeks ending January 29, 62 for the four weeks ending February 26, and 60 for the five weeks ending April 2. As will be perceived when we come to review the succeeding quarter of the year, a still more rapid retrogression in the fatality and prevalence of small-pox ensued during those three months, while in the quarter ending October 1, it became virtually extinguished, as was indicated by an insignificant mortality.

Scarlatina, also, during this first quarter exhibited a very exceptional virulence, being credited with 418 deaths, a larger quarterly mortality than had distinguished this formidable disease for eight previous years.

It prevailed indiscriminately throughout every well-populated district of the city. In the upper and less densely peopled portion there occurred an epidemic of this disease so violent in its character, and restricted to so well defined a territory, as to excite the suspicion of some pernicious local influence and call for a special investigation.

The district referred to lies between One Hundred and Second and One Hundred and Tenth streets (Twelfth Ward), extending for about a block easterly from the New Boulevard or Old Bloomingdale road, and occupying a narrow valley or depression of inconsiderable depth. As a rule it is sparsely inhabited; but in several spots appear aggregations of dwellings mostly of an inferior character. A large portion of this territory is in an execrable sanitary condition, arising principally from defective drainage. The original natural drainage by a few sluggish brooks, or more properly ditches, is still depended upon to convey away the refuse of several hundred houses, at whose very doors a magnificent avenue is being completed, without any attention to the sanitary requirements of the vicinity. The ditches mentioned converge from various quarters, and unite into a single current, which crosses under the Boulevard through a culvert, and thence taking a southwesterly course along a little valley, finally empties into the Hudson, at the foot of Ninety-sixth street, Stryker's Bay. The culvert referred to is the principal source of trouble. Being the sole outlet for an extensive drainage, in times of heavy rain it proves insufficient for its purpose, causing an overflow of the whole valley behind it, inundating dwellings and invading privies, whose contents are thereby scattered abroad.

The pernicious effects of such a condition of things was illustrated by the local prevalence and malignity of scarlatina for several months within the region described. It is almost superfluous to add that intermittent and remittent fevers are habitual throughout the same neighborhood.

Forty-five deaths from relapsing fever were registered during the quarter. The circumstances of its introduction into the city are obscure, but it had doubtless existed here months previous to its actual discovery, and its fatal termination had always been attributed to other causes—usually typhoid fever—as was the case in Germany at the commencement of the epidemic of 1847. Its presence among us once established,

DEATHS FROM ZYMOTIC DISEASES.

NEW YORK. DEATHS FROM SMALL-POX, MEASLES, SCARLATINA, DIPHTHERIA, WHOOPING COUGH, TYPHOID FEVER, TYPHUS FEVER, CHOLERA INFANTUM, DIARRHŒAL MALADIES, AND OTHER ZYMOTIC DISEASES.

Registered during the thirteen weeks ending Saturday, April 2, 1870.

WARDS.	Small-pox.	Measles.	Scarlatina.	Diphtheria.	Croup.	Whooping Cough.	Typhus Fever.	Typhoid Fever.	Cholera Infantum.	Cholera Morbus, and other Diarrhœal Diseases.	Other Zymotic Diseases.	Total Deaths from Zymotic Diseases.	Total Deaths from all Causes.	Total Population (in Wards), Census of 1870.	Percentage of Zymotic Deaths on Total Mortality.	Death-rate per 1,000 Annually of the Population from Zymotic Causes.	Death-rate per 1,000 Annually of the Population from all Causes.	REMARKS.
First			1	1				1	1		4	8	81	14,493	9.87	2.21	22.40	Castle Garden and E. Depot, 1.
Second													9	1,312			27.44	
Third											1	3	15	3,715	20.00	3.21	16.15	
Fourth	1		12	3	3	2		1		2	12	40	176	23,787	22.72	6.72	29.60	
Fifth	1	1	15	3	3	2		3	1	1	1	31	120	17,152	25.83	7.24	27.99	New York Hospital, 8.
Sixth	1	2	7	1				3	1	1	11	28	168	21,153	22.62	7.18	31.77	City Prison, 3.
Seventh	4	1	26	4	4	3		1		1	10	50	294	44,819	23.81	6.21	26.24	
Eighth	6		12	2	2	4		4			14	40	214	34,913	22.89	5.61	24.51	
Ninth	4		10	3	2	2		1			14	35	279	47,007	16.12	3.78	23.44	St. Vincent's Hospital, 31; Jefferson Market Prison, 1.
Tenth	5	1	19	3	7	1		1	1	1	11	50	247	41,411	20.24	4.83	25.86	Essex Street Jail, 1.
Eleventh	12	4	25	13	12	6	6	4	1	2	14	106	415	64,230	25.54	6.60	25.81	St. Francis' Hospital, 25.
Twelfth	1	10	26	4	4		7	24	4	25	68	183	473	47,495	38.69	15.41	39.84	Ward's Island, 143; Randall's Island, 11; Bloomingdale Lunatic Asylum, 3; Infants' Hospital, 131; Relapsing Fever Hospital, 11; Colored Orphan Asylum, 2; Juvenile Asylum, 1; House of Mercy, 1; House of Refuge, 2; House of Good Shepherd, 3; Deaf and Dumb Asylum, 2.
Thirteenth	3	1	18	1	3	2	1	2		2	7	40	214	33,365	18.69	4.79	25.65	
Fourteenth	3	1	19	3	3		1	2		1	9	38	188	29,431	20.21	5.75	28.45	
Fifteenth	3		5	2	2			1		11	15	49	262	27,586	16.41	6.22	37.99	Foundling Hospital, 140.
Sixteenth	2	1	20	6	4	1		2		3	14	54	253	48,360	21.34	4.66	20.92	St. Joseph's Home, 3.
Seventeenth	58	2	15	10	7	5	4	2	3	2	15	159	571	95,111	27.84	6.66	23.93	
Eighteenth	21		37	10	7	1	2	5	1	4	15	104	284	59,598	26.89	6.98	25.77	
Nineteenth	50		48	8	4	2	4	17		23	63	227	947	86,055	23.97	10.55	44.02	City Lunatic Asylum, 29; Alms-house, 37; Penitentiary, 3; Small-pox, 52; Charity Hospital, 230; Epileptic and Paralytic Hospital, 9; Colored Home Hospital, 44; Nursery and Child's Hospital, 37; St. Luke's Hospital, 35; Work-house, 13; Inebriate Home, 1; Industrial School, 1; Woman's Hospital, 1; German Hospital, 28; Fever Hospital, 23; Roman Catholic Orphan Asylum, 8.
Twentieth	1	1	22	5	2	1	1	5	1	6	21	85	400	75,318	20.75	4.40	21.24	Mount Sinai Hospital, 13.
Twenty first	3	1	14	3	3	1	1	7	2	4	22	75	460	56,709	16.30	5.29	32.45	Bellevue Hospital, 246.
Twenty second	8	1	26	10	6	4		7	1	8	5	81	347	71,362	23.34	4.54	19.46	Old Ladies' Home, 1.
Totals	201	28	418	94	120	48	31	109	16	111	367	1,547	6,547	942,259	20.49	6.48	27.07	Total Deaths in Public Institutions, 1,324.

its peculiarities rendered its recognition comparatively easy. Its subsequent history in New York does not differ materially from the same in other cities.

Measles, diphtheria, and croup, were all during this quarter marked by a fatality below the average. Typhoid fever caused one hundred deaths, a decrease of thirty-nine from the previous quarter. It was confined to no particular section of the city. Phthisis pulmonalis and the local respiratory complaints destroyed about the usual number of lives.

With the exception of those diseases more particularly dwelt upon, the mortality of this quarter presents no other distinctive features.

SECOND OR SPRING QUARTER OF 1870. THIRTEEN WEEKS, ENDING JULY 2.

During this quarter there were registered 3,239 births, 2,006 marriages, and 6,293 deaths, being a decrease, as compared with the winter quarter, of 611 births, 25 marriages, and 224 deaths.

Meteorology.

The mean temperature of April was 52.01°, its average temperature for the previous ten years having been 49.22°. Snow or rain fell upon twelve days of the month to the amount of 6.10 inches, its average rainfall during the previous ten years having been 3.71 inches. The mean reading of the barometer for April was 29.774, and the mean humidity 59.53.

The mean temperature of May was 62.79°, its average temperature for the previous ten years having been 57.84°. Rain fell upon fifteen days of the month to the amount of 3.08 inches, its average rainfall during the previous ten years having been 5.05 inches. The mean reading of the barometer for May was 29.820, and the mean humidity 55.07.

The mean temperature of June was 74.12°, being 3° higher than that of the corresponding month for ten years back, with the exception of June, 1865, when it reached 77.13°. The average temperature of this month, for the previous ten years, was 69.04°. Rain fell upon thirteen days of the month to the amount of 2.85 inches, its average rainfall for the previous ten years having been 4.92 inches. The mean reading of the barometer for June was 29.838, and the mean humidity 63.43.

Deaths in the City of New York from all Causes (in Quinquenni

MONTHS.	NATIVITY.				Colored.		Under 1 year.		1	
	United States		Foreign.							
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
April	622	497	396	365	21	17	385	314	79	6
May	557	504	371	280	19	15	364	306	64	14
June	948	846	488	397	28	29	580	465	117	110
Total	2,127	1,847	1,255	1,043	68	61	1,329	1,085	260	230
Percentage of deaths in each period of life on total mortality of quarter	32.69	28.35	19.28	17.94	1.09	.97	36.62	14 13	4.12	3.77
Total of both sexes	3,967		2,298		134		2,945		490	
Percentage of both sexes on total mortality of quarter	60.64		35.96		1.91		30.95		7.69	

MONTHS.	35		41		45		51		55	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
April	57	53	62	54	36	37	46	39	31	32
May	49	58	52	36	32	36	46	37	31	32
June	78	77	74	57	32	37	52	43	32	36
Total	174	188	184	147	100	110	144	109	94	100
Percentage of deaths in each period of life on total mortality of quarter	2.78	2.86	2.78	2.22	2.51	1.59	2.25	1.70	1.47	1.56
Total of both sexes	362		331		210		253		194	
Percentage of both sexes on total mortality of quarter	5.64		5.17		3.15		4.02		3.03	

Periods) during the thirteen weeks ending Saturday, July 2, 1870.

2		3		4		Total under 5 years.		5		10		15		20		25		30	
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
41	44	34	20	18	12	437	359	46	35	13	7	24	14	37	58	51	50	44	44
41	29	27	33	17	10	413	332	38	28	12	12	10	18	35	46	30	53	53	46
53	44	25	22	19	17	744	666	53	34	23	19	28	20	51	51	71	51	74	65
135	117	86	75	54	39	1,594	1,357	137	97	48	38	62	52	123	155	152	154	171	155
2.14	1.86	1.37	1.19	.86	.62	25.33	21.56	2.18	1.54	.76	.60	.98	.83	1.95	2.46	2.41	2.45	2.72	2.46
252		161		93		2,951		234		86		114		278		306		326	
4.00		2.56		1.48		46.89		3.72		1.36		1.81		4.41		4.86		5.18	

60		65		70		75		80		85		90		95		100 and Upward.		Total by Sexes.		Total both Sexes.
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
34	29	33	19	12	35	15	15	14	10	4	5	1	1	....	2	1	1	1,010	862	1,872
25	20	29	16	11	29	13	15	9	18	2	9	4	4	....	....	....	1	920	827	1,747
27	25	27	25	26	23	16	14	8	6	3	5	1	3	1	....	1	....	1,431	1,243	2,674
86	74	89	60	49	87	44	44	31	34	9	19	6	8	1	2	2	2	3,361	2,932	6,293
1.37	1.17	1.41	.95	.78	1.38	.70	.70	.49	.54	.14	.30	.09	.13	.02	.03	.03	.03	53.41	46.59	100.00
160		149		136		88		65		28		14		3		4		6,293		
2.54		2.36		2.16		1.40		1.03		.44		.22		.05		.06		100.00		

The mean temperature of the quarter was 62.97°, its average temperature for the previous ten years having been 58.7°. The maximum temperature was 95° on June 26, and the minimum 32.8° on April 4. The highest degree of humidity was 83 on June 12, and the lowest 28.06 on May 1, the mean humidity for the quarter being 59.24. The highest reading of the barometer was 30.189 on May 31, and the lowest 29.513 on May 4, the mean being 29.820. Thunder-showers occurred on May 13, 20, and 21, and on June 15, 16, 17, 20, 27, and 28. Lightning without thunder was observed on May 19 and June 18. Rain fell upon thirty days of the quarter to the amount of 12.03 inches, its average rainfall for the ten previous years having been 13.79 inches.

DEATHS REGISTERED EACH WEEK, BY CLASSES, FOR THE SECOND QUARTER, ENDING JULY 2, 1870.

CLASSES.	WEEKS.													
	1	2	3	4	5	6	7	8	9	10	11	12	13	Total each Class.
	April 3d to April 9th.	10th to 16th.	16th to 23d.	23d to 30th.	30th to May 7th.	7th to 14th.	14th to 21st.	21st to 28th.	28th to June 4th.	4th to 11th.	11th to 18th.	18th to 25th.	25th to July 2d.	
Zymotic	100	105	96	112	87	83	105	90	87	121	116	179	*399	1680
Constitutional	116	105	91	108	118	121	120	109	116	106	86	135	137	1468
Local	213	228	194	214	182	175	203	164	165	155	159	141	263	3476
Developmental	40	36	22	14	19	32	39	33	27	29	29	36	48	405
Violence	19	23	18	18	19	14	16	16	22	24	22	15	37	263
Total	488	497	421	466	425	425	483	414	417	435	412	506	*904	6892

* Only 773 deaths were registered during this week. During the succeeding week the new system of recording actual mortality required that 131 deaths should be credited to the week ending July 2, where they belonged; 64 of these were zymotic, 16 constitutional, 36 local, 6 developmental, and 9 from violence.

Mortality.

The registered mortality of this quarter exhibited a decrease of 224 deaths as compared with that of the first quarter. With the exception

of 1861 and 1869, a similar diminution had marked the corresponding quarter for fifteen years past. The mortality, however, during this quarter, was high, being in excess by 965 over its average for the ten previous years, and greater by 228 than that of any spring quarter within the same period. The explanation of this excess lies principally in the extraordinary number of deaths from diarrhœal diseases and the prevalence and fatality of relapsing fever. The deaths of 622 persons from diarrhœa, cholera infantum, and kindred maladies, were registered during the quarter, being 41 per cent. more than had been recorded against the same period of 1869, 129 per cent. over that of 1868, 170 per cent. over that of 1867, and 83 per cent. more than for the spring quarter of 1866, during which the existence of Asiatic cholera as an epidemic became apparent. Of these 622 deaths two-thirds took place in infants less than one year old, the mortality among such children augmenting by a geometrical ratio during the successive weeks of June, until for the week ending July 2 there were recorded 228 fatal cases of infantile diarrhœa. This early accession of mortality from the cause specified was undoubtedly due to the intense heat which began to manifest itself during the month of June, elevating its mean temperature to 74.12°, and constituting it the hottest June since 1865.

One hundred and six deaths were reported during this quarter as resulting from relapsing fever. The epidemic now reached its height, subsequently declining, as will be observed, during the succeeding three months. Its malignity, likewise, in this spring quarter, would appear to have almost doubled, as the percentage of deaths upon cases reported to the Bureau of Sanitary Inspection was nearly 12 per cent. against 6¼ per cent. in the previous quarter.

Small-pox, scarlatina, and typhoid fever diminished during this quarter by 127, 160, and 29 deaths respectively. The improvement usual at this season was noticeable in phthisis and pulmonary affections generally.

The excessively high temperature of June was the occasion of 44 deaths from the direct effect of solar heat. In July and August, however, as we shall soon perceive, these unfortunate cases were multiplied enormously.

DEATHS FROM ZYMOTIC DISEASES.

NEW YORK.—Deaths from Small-pox, Measles, Scarlatina, Diphtheria, Whooping Cough, Typhoid Fever, Typhus Fever, Cholera, Cholera Infantum, Diarrhœal Maladies, and other Zymotic Diseases.

Registered during the **thirteen weeks** ending Saturday, July 2, 1870.

Wards.	Small-pox.	Measles.	Scarlatina.	Diphtheria.	Croup.	Whooping Cough.	Typhus Fever.	Typhoid Fever.	Cholera.	Cholera Infantum.	Cholera Morbus, and other Diarrhœal Diseases.	Other Zymotic Diseases.	Total Deaths from Zymotic Diseases.	Total Deaths from all Causes.	Total Population (in Wards), Census of 1870.	Percentage of Zymotic Deaths on Total Mortality.	Death-rate per 1,000 Annually of the Population from Zymotic Causes.	Death-rate per 1,000 Annually of the Population from all Causes.	REMARKS.
First	1	..	....	1	2	1	..	1	..	14	3	6	28	115	14,463	25.21	8.02	31.81	Castle Garden and E. Depot, 7.
Second	..	..	....	1	..	..	..	1	..	....	.....	1	3	12	1,312	25.00	9.14	36.59	
Third	1	..	2	..	..	..	..	..	..	....	.....	2	5	17	3,715	29.41	5.38	18.30	
Fourth	1	..	3	..	2	..	..	..	..	3	8	10	29	125	23,787	23.20	4.88	21.02	
Fifth	..	..	9	2	4	2	..	..	..	5	1	1	24	116	17,152	20.69	5.59	27.05	
Sixth	..	1	7	1	2	1	1	2	..	1	4	12	32	140	21,153	22.85	6.05	26.47	City Prison, 5; Reception Hospital, 1.
Seventh	..	2	16	2	6	5	..	3	..	16	12	14	76	255	44,819	29.80	6.78	22.76	
Eighth	2	1	8	3	4	1	1	2	1	13	6	8	50	241	34,913	20.74	5.72	27.61	
Ninth	1	..	15	3	3	1	..	4	..	8	6	9	56	237	47,607	21.09	4.20	19.91	St. Vincent's Hospital, 30.
Tenth	3	3	10	5	6	2	..	..	..	12	13	3	57	215	41,411	26.51	5.50	20.77	Essex Street Prison, 1.
Eleventh	4	5	19	8	6	3	3	6	..	20	23	17	114	426	64,230	26.76	7.10	26.53	St. Francis' Hospital, 26.
Twelfth	1	8	30	9	8	5	8	11	..	29	27	119	258	616	47,495	41.88	21.72	51.87	Ward's Island, 137; Randall's Island, 13; Bloomingdale Lunatic Asylum, 6; Infant's Hospital, 119; Hart's Island R. F. Hospital, 88; House of Refuge, 2; Colored Orphan Asylum, 6; St. Joseph's Home, 2; House of Good Shepherd, 8; House of Mercy, 8; Deaf and Dumb Asylum, 2.
Thirteenth	4	..	10	3	3	..	1	1	..	9	15	2	48	209	33,365	22.99	5.76	25.06	
Fourteenth	1	..	3	2	4	1	1	3	..	10	4	5	34	141	26,431	23.68	5.14	21.34	
Fifteenth	..	..	....	1	2	1	1	2	..	3	71	15	96	270	27,586	35.55	13.92	39.15	Foundling Hospital, 166.
Sixteenth	1	..	5	1	2	2	..	1	..	9	13	5	39	217	48,360	17.97	3.22	17.95	
Seventeenth	8	4	25	7	8	3	1	5	..	43	33	9	156	578	95,411	27.16	6.54	24.22	
Eighteenth	4	5	19	1	5	3	..	2	..	23	12	9	81	310	59,598	26.12	5.43	20 80	Home for Respectable Aged Indigent Women, 3.
Nineteenth	37	..	22	3	5	6	12	10	..	16	35	54	200	742	86,055	26.95	9.29	34.49	City Lunatic Asylum, 22; Almshouse, 39; Penitentiary, 3; Small-pox, 37; Charity Hospital, 154; Epileptic and Paralytic Hospital, 10; Colored Home Hospital, 37; Nursery and Child's Hospital, 44; St. Luke's Hospital, 27; Women's Hospital, 5; German Hospital, 20; Work-house, B. I., 18; R. C. Orphan Asylum, 3; Fever Hospital, 9; Inebriate Asylum, 1.
Twentieth	..	6	11	3	5	5	..	2	..	27	21	16	99	431	75,318	22.73	5.25	22.89	Mount Sinai Hospital, 16.
Twenty-first	1	1	10	2	4	3	..	6	..	2	12	40	81	532	53,709	15.22	5.71	37.53	Bellevue Hospital, 259.
Twenty-second	4	8	21	11	10	4	1	4	..	19	20	17	119	348	71,362	34.19	6.67	19.51	Old Ladies' Home, 2.
Totals	74	44	258	69	80	49	20	71	1	282	339	374	1,080	6,998	942,252	26.09	7.13	26.71	Total Deaths in Institutions, 1,896.

THIRD OR SUMMER QUARTER OF 1870—THIRTEEN WEEKS, ENDING OCTOBER 1.

During this quarter there were registered 3,548 births and 1,756 marriages, and there occurred 8,416 deaths, being, as compared with the previous quarter, a decrease in marriages of 250, and an increase of 309 births and of 2,123 deaths.

Meteorology.

The mean temperature of July was 77.92°, being four degrees higher than that of the corresponding month of 1869, and 2.5° higher than the average temperature of July for the previous ten years. Rain fell upon twelve days of the month to the amount of 4.80 inches, its average rainfall for the previous ten years having been 4.40 inches. The mean reading of the barometer for July was 29.809, and the mean humidity 57.10.

The mean temperature of August was 77.26°, being .5° higher than that of any corresponding month during the previous ten years, the average temperature of this month for the same period having been 74.16°. Rain fell upon twelve days of the month to the amount of 3.68 inches, its average rainfall during the previous ten years having been 4.71 inches.

The mean reading of the barometer for August was 29.880, and the mean humidity 52.10.

The mean temperature of September was 68.91°, slightly below that of the same month of 1869, its average temperature for the previous ten years having been 66.03°. Rain fell upon six days of the month to the amount of 2.38 inches, its average rainfall for the previous ten years having been 3.79 inches.

The mean reading of the barometer for September was 30.019, and the mean humidity 53.97.

The mean temperature of the quarter was 74.69°, its average temperature for the previous ten years having been 71.86°. The highest temperature in the shade was 97.5° on July 25, and the lowest 37° on September 20, the latter being quite extraordinary. The highest sun temperature was 128.8° on July 18, and the lowest 70° on September 17. The greatest degree of humidity was 84.03 on September 30, and the least 24.23 on September 19. The highest reading of the barometer

Deaths in the City of New York from all Causes (in Quinquennial

MONTHS.	Nativity.				Colored.		Under 1 year.		1	
	United States.		Foreign.							
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
July	1,266	1,107	529	457	28	16	881	748	191	197
August	965	862	371	335	22	15	542	488	206	187
September	791	760	473	440	21	16	406	365	165	168
Total	3,022	2,789	1,373	1,232	71	47	1,779	1,601	562	552
Percentage of deaths in each period of life on total mortality	35.90	33.14	16.31	14.64	0.84	0.56	21.14	19.02	6.68	6.56
Total of both sexes	5,811		2,605		118		3,380		1,114	
Percentage of both sexes on total mortality of quarter	69.04		30.95		1.40		40.16		13.24	

MONTHS.	35		40		45		50		55	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
July	71	60	79	60	55	41	49	34	40	29
August	54	46	50	27	49	34	36	33	34	24
September	67	61	64	58	32	37	59	40	45	39
Total	192	167	193	145	142	112	144	97	119	92
Percentage of death in each period of life on total mortality	2.28	1.98	2.29	1.72	1.69	1.33	1.71	1.15	1.41	1.09
Total of both sexes	359		338		254		241		211	
Percentage of both sexes on total mortality of quarter	4.26		4.01		3.02		2.86		2.50	

Periods), *during the thirteen weeks ending Saturday, October* 1, 1870.

2		3		4		Total under 5 years.		5		10		15		20		25		30	
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
45	46	23	20	13	17	1,103	1,028	42	29	19	13	24	36	47	59	66	56	72	60
44	41	21	18	10	10	823	744	30	16	16	11	20	34	46	42	55	46	46	46
37	38	12	26	12	13	632	610	31	8	15	18	25	30	47	51	63	58	60	56
126	125	56	64	35	40	2,558	2,382	103	53	50	42	69	100	140	152	184	160	178	162
1.50	1.48	0.67	0.76	0.42	0.47	30.40	28.30	1.23	0.62	0.59	0.50	0.82	1.19	1.66	1.81	2.19	1.90	2.12	1.93
251		120		75		4,940		156		92		169		292		344		340	
2.98		1.43		0.89		58.70		1.85		1.09		2.01		3.47		4.09		4.04	

60		65		70		75		80		85		90		95		100 and Upward.		Total by Sexes.		Total both Sexes.
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
42	35	26	29	26	25	17	23	6	10	3	6	2	....	....	1	....	....	1,795	1,624	3,419
27	19	11	18	18	18	11	27	6	9	3	1	....	2	1	....	....	....	1,336	1,197	2,533
23	30	26	30	22	27	13	17	7	14	10	9	2	5	....	1	....	1	1,264	1,200	2,464
11	84	63	77	66	70	41	67	19	33	16	16	4	7	1	2	....	1	4,395	4,021	8,416
1.34	1.00	.75	.91	.78	.83	.49	.79	.23	.39	.19	.19	.05	.08	.01	.02	....	.01	52.22	47.78	100
197		140		136		108		52		32		11		3		1		8,416		
2.34		1.66		1.61		1.28		.62		.38		.13		.03		.01		100		

was 30.287 on August 27, and the lowest 29.603 on September 4. The mean reading of the barometer was 29.900, and the mean humidity 55.34. Rain fell upon thirty days of the quarter to the amount of 10.8 inches, the mean rainfall of this quarter for the ten previous years having been 12.91 inches. Violent gales occurred on August 4 and September 17. Thunder showers took place on July 12, 16, 17, and 28, and on August 4, 10, 11, 13, and 25. Lightning without thunder was observed on the nights of July 17, 19, 24, 25, 26, and 27; on August 9 and 12, and on September 3.

The aurora borealis was visible on the nights of August 19, 28, 29, and 31, and on September 5, 7, 20, 23, 24, 25, 26, and 27, displaying unusual brilliancy on the nights of the 23d and 24th of September.

DEATHS OCCURRING EACH WEEK, BY CLASSES, FOR THE THIRD QUARTER ENDING OCTOBER 1, 1870.

CLASSES.	WEEKS.													
	1	2	3	4	5	6	7	8	9	10	11	12	13	Total each Class.
	July 2d to July 9th.	9th to 16th.	16th to 23d.	23d to 30th.	30th to Aug. 6th.	6th to 13th.	13th to 20th.	20th to 27th.	27th to September 3d.	3d to 10th.	10th to 17th.	17th to 24th.	24th to October 1st.	
Zymotic	303	400	500	434	335	324	272	246	190	176	169	132	174	3655
Constitutional	147	107	151	177	135	150	136	128	141	116	117	125	118	1748
Local	142	172	329	296	162	174	137	149	145	150	140	143	156	2295
Developmental	30	43	39	46	30	27	21	26	35	32	30	31	34	424
Violence	19	35	22	27	19	21	19	22	25	18	19	24	24	294
Total	641	757	1041	980	681	696	585	571	536	492	475	455	506	8416

Mortality.

The records for this quarter present a statement of *actual* mortality. In comparing its statistics with those of former periods we shall necessarily be forced to assume, as usual, that to all intents and purposes the registered and actual mortality approximate so nearly as not to affect

our results materially. It will remain for the future to accumulate statistics which can be regarded as absolutely perfect.

Eight thousand four hundred and sixteen persons died during these three months—2,123 more deaths than had been registered in the preceding quarter. This increase appears excessive, but on comparing the spring and summer quarters of fifteen previous years we discover a greater discrepancy between them in six instances, viz., 1868, '67, '66, '63, '59, and '56, as the subjoined comparative table shows:

YEAR.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.
Deaths in spring quarter.....	5,291	4,680	5,228	5,377	4,922	5,774	5,213	4,899	5,567	5,909	5,649	5,635	5,121	5,523	6,065	6,293
Deaths in summer quarter.....	6,994	6,905	6,890	7,379	7,123	6,152	6,266	6,610	8,018	7,792	7,503	9,787	7,516	8,658	7,390	8,416
Mean temperature of summer quarter	73°	72°	70°	71°	69°	70°	72°	71°	70°	69°	76°	71°	71°	75°	72°	74°
Excess of summer mortality.....	1,703	2,225	1,662	2,002	2,201	378	1,053	1,711	2,451	1,883	1,854	4,203	2,395	3,135	1,325	2,123

The mortality from diarrhœal affections amounted to 2,789, or 33 per cent. of the total, being relatively 4 per cent. greater than for the corresponding quarter of 1869, 2 per cent. greater than that of 1867, 2 per cent. less than that of 1868, and 7 per cent. less than that of 1866.

Of these deaths 95 per cent. occurred in children less than five years old, 92 per cent. in children less than two years old, and 67 per cent. in those less than a year old; being, as regards children under five years of age, about the same relative mortality as in 1869, but 8 per cent. higher in children under two years of age, and 3 per cent. higher in those less than a year old. Compared with 1868, a year in which the summer season was especially characterized by a heavy mortality from diarrhœal complaints (amounting to 35 per cent. of the whole), the quarter under consideration shows a relative excess of 2 per cent. in children under five, 3 per cent. in those under two, and 4 per cent. in those under one.

Zymotic diseases in the aggregate destroyed 43 per cent. of the lives cut off during this quarter, a proportion corresponding very nearly with that of the same period of 1867, 1868, and 1869, but greatly exceeded by that of 1866, in which year almost 50 per cent. of the summer mortality was of zymotic origin. Small-pox, which, as we have seen, produced 74 deaths in the spring quarter of 1870, became nearly extinct

during the summer, only six persons having succumbed to it. Scarlatina continued very prevalent and destroyed 106 lives, 101 of which were those of children five years old or less. All of the deaths from measles (89), from croup (60), and from whooping-cough (65), were confined to the same period of life.

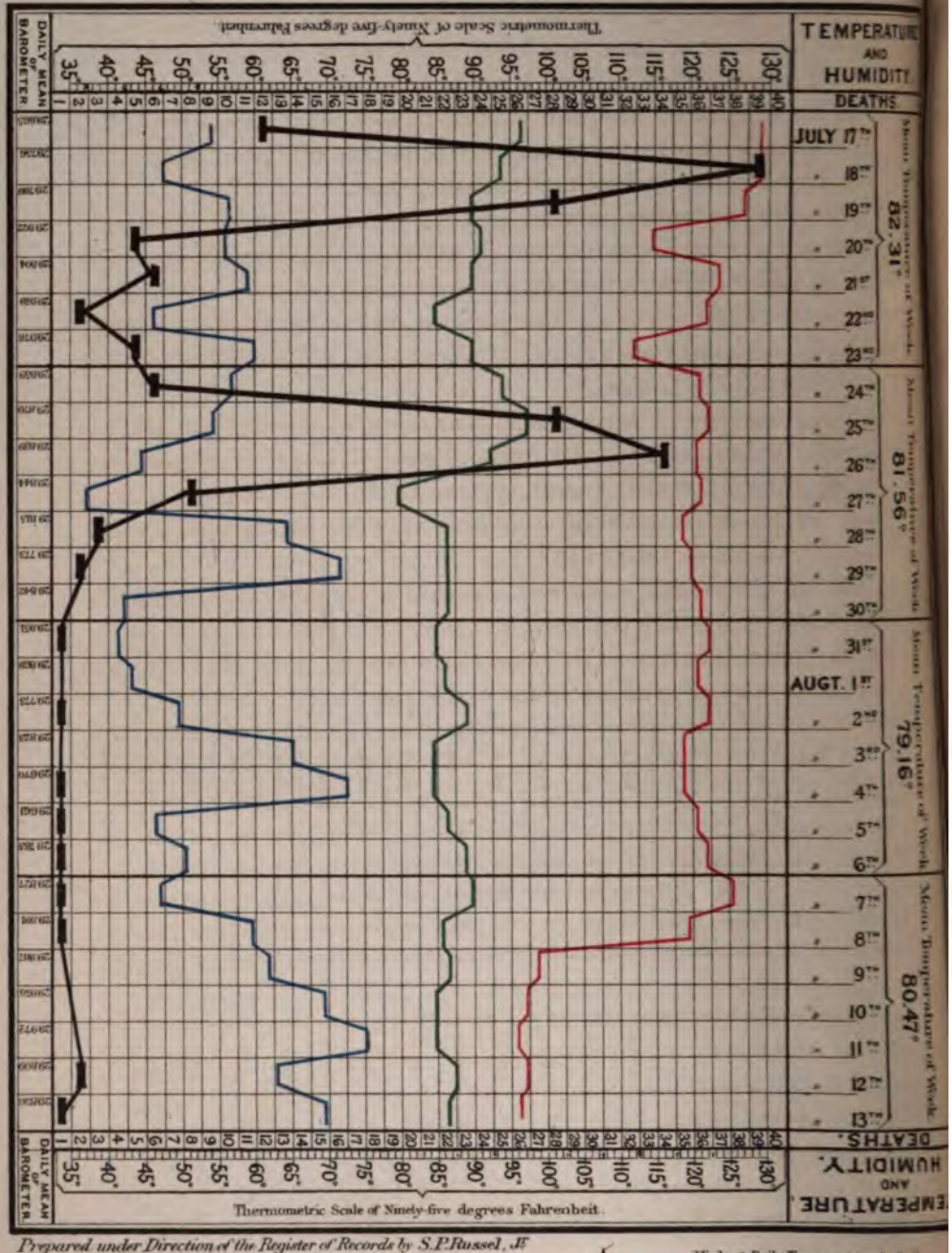
Typhus fever during this quarter occasioned only 17 deaths. The mortality from typhoid fever, on the other hand, increased progressively as that from both typhus and relapsing fever—but more particularly the latter—diminished. The following statement exemplifies this fact:

	NO. OF DEATHS FROM TYPHOID FEVER.	NO. OF DEATHS FROM TYPHUS FEVER.	NO. OF DEATHS FROM RELAPSING FEVER.
July	33	4	10
August	41	11	8
September	58	2	7
Total	132	17	25

Remittent and intermittent fevers were remarkably wide-spread and malignant during this quarter, the former causing 53 deaths and the latter 30. These two fevers had been credited with 31 and 10 deaths respectively in the corresponding quarter of 1869, and with 31 and 5 in that of 1868, the last figures presenting about a fair average, of late years, for this season. The same fevers prevailed also very extensively and severely during these three months of 1870 in the circumjacent country, appearing in districts whose inhabitants had never suffered from them before. In the city itself they were more prevalent and malignant in the upper wards (Twelfth and Nineteenth), where the insalubrious conditions most propitious for their development unfortunately exist, owing to obstruction of natural and neglect of artificial drainage. The undue production of these fevers was the essential result of extensive evaporation, promoted by intense atmospheric heat, and the subsequent evolution of paludal miasm from marshes which

CHART

Illustrating Mortality from Solar Heat, during the Four Weeks ending July 23rd 30th — Augt. 6th 13th 1870: with the Meteorological Observations for the same period



Prepared under Direction of the Register of Records by S.P.Russel, Jr.

Explanation.

- Highest Daily Temperature in Sun
- do. " " Shade
- do. " Degree of Humidity
- Mortality.

had been underlying pools and inundated spaces. The subject of the proper drainage of these overflowed tracts is one demanding the most careful consideration, as there is needed a comprehensive system which shall not only prove adequate to immediate sanitary requirements, but shall likewise insure the permanent protection of future generations who may dwell over these now unhealthy sites.

To quote the impressive words of Dr. Pickford: "There is, probably, no subject so complex, so incalculably difficult to grapple with, especially if it be how to apply a remedy, as the drainage and sewerage of large, overgrown cities. Yet we must perceive that unless this be efficiently done, *an ultimate limit is set by the hand of man himself to dynasties, to peoples, and to nations.*"

In the category of nervous affections the most characteristic and deplorable consequence of the extraordinary elevation of temperature during June, July, and August, appears in the large number of fatal cases of the direct effect of solar heat, viz.: 194 in July and August, and 44 in June—a total of 238.

Within the present century so excessive a mortality from this cause has characterized only two previous years, viz.: 1866 and 1853—so far as our information upon this subject is authentic, as is shown by the following table of recorded deaths in this city:

YEAR.	1842.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.
Deaths by solar heat.....	1	7	34	11	11	36	20	31	15	200	62	50	33	16
Mean temperature of June.....		71°	65°	65¼°	69°	64°	70½°	68°	70°	71°	70°	69°	70°	66°
" " July.....		76½°	72°	74°	72°	74°	75°	74°	76½°	73°	77°	78°	77°	75°
" " August.....		76°	73°	71°	71°	72½°	72°	70°	73½°	73°	74°	74°	71°	72°

YEAR.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1970.
Deaths by solar heat.....	43	6	12	15	44	219	40	14	310	5	196	26	238
Mean temperature of June.....	72°	68°	71°	71°	66¾°	66°	67°	77°	68°	68°	68°	67¾°	74.1°
" " July.....	74°	73°	74½°	75°	73°	74°	73°	78°	78.6°	73°	81°	73.7°	77.0°
" " August....	72°	72°	75°	73°	74°	75°	76°	76.7°	68°	74°	76°	74°	77.2°

By the above table we learn that the mortality from this cause in 1866 far exceeded that in any other year. The week ending July 21 1866, will always be a memorable epoch in the mortuary history of New York, 184 deaths from sunstroke having been registered within that brief but fatal period. The mean temperature of that week was $82\frac{5}{7}°$. The week ending July 18, 1868, approached within 36 deaths the figure just stated—its mortality from sunstroke amounting to 148. Its mean temperature rose to 88°, and it was in all probability the hottest week ever experienced in New York. The greatest number of deaths from this cause in 1870 occurred during the week ending July 23, and amounted to 97. Its mean temperature was 82.31°.

The accompanying chart illustrates the actual daily mortality from solar heat during the two fatal weeks of July, and the ensuing two weeks of August. That the association of excessive atmospheric humidity with exaggerated solar heat begets these catastrophes, as some have affirmed, would not appear to be demonstrated by the chart. As sudden deaths following direct exposure to the sun's rays constitute the great majority of such cases, there is little doubt that the peril is principally in proportion to the measure of caloric contained in those rays. Of course we do not lose sight of pathological modifications which render individual systems peculiarly liable to these casualties, such as the effects of intemperance and other debilitating influences. The first is well recognized as the most potent contributing cause, habitual drunkards furnishing a large proportion of sunstrokes.

Dr. George Thin, of Shanghae, in a paper recently read before the Medico-Chirurgical Society of Edinburgh, is inclined to attribute the production of sunstroke in a large measure to electrical disturbances. He remarks:

"In August, 1866, we had in Shanghae a fortnight of very hot weather, during which there occurred an unusual number of sunstrokes. The thermometer marked 96 degrees in the shade during the day, and the fall at night was little below ninety degrees.

"Heat alone is not sufficient to account for the extraordinary number of cases which occurred during the last few days of the fortnight referred to. During these days the listress which every one experienced, and the peculiarity of the sensation by which this listress was marked, caused it to be commonly observed in conversation that there was some electric irregularity in the atmosphere—a supposition rendered the more probable by its disappearance coincidently with a heavy rain that fell from an almost cloudless sky. The relief we all experienced was immediate, and new cases of sunstroke ceased

DEATHS FROM ZYMOTIC DISEASES.

NEW YORK.—DEATHS FROM SMALL-POX, MEASLES, SCARLATINA, DIPHTHERIA, WHOOPING-COUGH, TYPHOID FEVER, TYPHUS FEVER, CHOLERA, CHOLERA INFANTUM, DIARRHŒAL MALADIES, AND OTHER ZYMOTIC DISEASES.

During the thirteen weeks ending Saturday, October 1, 1870.

WARDS.	Small-pox.	Measles.	Scarlatina.	Diphtheria.	Croup.	Whooping-cough.	Typhus Fever.	Typhoid Fever.	Cholera.	Cholera Infantum.	Cholera Morbus and Other Diarrhœal Diseases.	Other Zymotic Diseases.	Total Deaths from Zymotic Diseases.	Total Deaths from all Causes.	Total Population (in Wards), Census of 1870.	Percentage of Zymotic Deaths on Total Mortality.	Death-rate per 1,000 Annually of the Population from the Zymotic Causes.	Death-rate per 1,000 Annually of the Population from all Causes.	REMARKS.
First	..	3	5	3	1	1	..	1	..	20	41	5	78	154	14,462	50.64	21.57	42.59	Castle Garden and E. Depot, 1.
Second	..	..	....	..	..	..	..	....	..	3	1	....	11	11	1,312	9.09	3.95	33.54	
Third	..	..	....	..	..	..	..	....	..	..	2	3	8	29	3,715	27.58	8.61	31.22	
Fourth	..	1	5	5	2	1	1	....	..	23	37	8	81	206	23,787	39.32	13.62	34.64	
Fifth	..	2	2	3	3	..	..	6	..	12	51	7	66	147	17,152	44.89	15.29	34.28	
Sixth	..	1	1	..	5	3	1	2	..	18	43	19	93	249	21,153	37.30	17.58	47.08	City Prison, 7; Reception Hospital, Centre St., 31.
Seventh	..	1	5	3	3	3	..	5	1	54	61	12	148	357	44,819	43.91	13.21	30.08	
Eighth	..	1	4	1	4	..	..	5	..	30	56	5	106	276	34,913	38.40	12.14	31.62	
Ninth	..	5	7	4	3	2	..	9	..	34	59	12	135	357	47,607	40.05	11.34	28.31	St. Vincent's Hospital, 26; Jefferson Market Prison, 1.
Tenth	..	3	3	5	1	1	..	5	..	27	77	9	131	318	41,411	41.19	12.65	30.72	
Eleventh	..	3	6	4	2	3	1	9	..	56	140	8	232	532	64,230	43.61	14.45	33.13	St. Francis Hospital, 25.
Twelfth	..	13	6	4	5	3	6	18	..	104	147	49	355	677	47,495	52.43	29.90	57.02	Ward's Island, 118; Randall's Island, 11; Bloomingdale Lunatic Asylum, 12; Infants' Hospital, 126; House of Good Shepherd, 6; Relapsing Fever Hospital, 3; Colored Orphan Asylum, 3; House of Refuge, 1; House of Mercy, 1.
Thirteenth	..	2	3	4	4	7	..	1	..	35	65	3	124	283	33,365	43.81	11.86	32.93	
Fourteenth	..	2	10	..	1	1	..	2	..	70	60	19	116	254	26,431	45.66	17.55	38.44	Lying-in Asylum, 1.
Fifteenth	..	..	....	..	..	1	..	3	..	18	117	8	147	233	27,586	63.09	21.31	33.79	Foundling Hospital, 1.
Sixteenth	..	3	5	8	3	8	..	7	..	38	55	12	139	313	48,360	44.40	11.49	25.89	St. Joseph's Home, 113.
Seventeenth	1	10	16	8	6	4	1	6	..	91	211	17	371	795	95,411	46.66	15.55	33.33	Eye Infirmary, 1.
Eighteenth	..	7	2	3	1	2	..	4	..	59	78	6	162	386	59,598	41.96	10.87	25.91	Home for Respectable Aged Indigent Women, 3.
Nineteenth	5	2	14	3	2	7	3	19	1	77	210	47	390	987	86,055	39.51	18.13	45.88	City Lunatic Asylum, 44; Almshouse, 30; Penitentiary, 2; Small-pox, 7; Charity Hospital, 136; Epileptic and Paralytic Hospital, 3; Workhouse, 10; Colored Home Hospital, 29; Nursery and Child's Hospital, 18; St. Luke's Hospital, 39; Woman's Hospital, 2; Inebriate Hospital, 1; Fever Hospital, 18; German Hospital, 21; Roman Catholic Orphan Asylum, 6.
Twentieth	..	11	2	2	1	8	1	12	..	66	141	29	273	622	75,318	43.89	14.50	33.03	Mount Sinai Hospital, 11.
Twenty-first	..	4	1	1	1	1	..	8	..	20	83	39	168	618	56,709	27.18	11.85	43.59	Bellevue Hospital, 313; Home for the Friendless, 1.
Twenty-second	..	15	13	6	12	9	3	10	1	71	175	16	331	652	71,362	50.76	18.55	36.55	
Totals	6	89	106	67	60	65	17	152	3	896	1,890	324	3,655	8,416	942,252	43.42	15.51	35.72	Total Deaths in Institutions, 1,182.

By the above table we learn that the mortality from this cause in 1866 far exceeded that in any other year. The week ending July 21 1866, will always be a memorable epoch in the mortuary history of New York, 184 deaths from sunstroke having been registered within that brief but fatal period. The mean temperature of that week was 82½°. The week ending July 18, 1868, approached within 36 deaths the figure just stated—its mortality from sunstroke amounting to 148. Its mean temperature rose to 88°, and it was in all probability the hottest week ever experienced in New York. The greatest number of deaths from this cause in 1870 occurred during the week ending July 23, and amounted to 97. Its mean temperature was 82.31°.

The accompanying chart illustrates the actual daily mortality from solar heat during the two fatal weeks of July, and the ensuing two weeks of August. That the association of excessive atmospheric humidity with exaggerated solar heat begets these catastrophes, as some have affirmed, would not appear to be demonstrated by the chart. As sudden deaths following direct exposure to the sun's rays constitute the great majority of such cases, there is little doubt that the peril is principally in proportion to the measure of caloric contained in those rays. Of course we do not lose sight of pathological modifications which render individual systems peculiarly liable to these casualties, such as the effects of intemperance and other debilitating influences. The first is well recognized as the most potent contributing cause, habitual drunkards furnishing a large proportion of sunstrokes.

Dr. George Thin, of Shanghae, in a paper recently read before the Medico Chirurgical Society of Edinburgh, is inclined to attribute the production of sunstroke in a large measure to electrical disturbances. He remarks:

"In August, 1868, we had in Shanghae a fortnight of very hot weather, during which were occurred an unusual number of sunstrokes. The thermometer marked 96 degrees in the shade during the day, and the fall at night was little below ninety degrees.

"Heat alone is not sufficient to account for the extraordinary number of cases which occurred during the last few days of the fortnight referred to. During these days the heaviness which every one experienced, and the peculiarity of the sensation by which this heaviness was marked, caused it to be commonly observed in conversation that there was some unusual irregularity in the atmosphere—a supposition rendered the more probable by its coincidence coincidently with a heavy rain that fell from an almost cloudless sky. The relief we all experienced was immediate, and few cases of sunstroke caused

to occur, although the fall in the thermometer was very slight. I mention this fact in confirmation of the view that amongst the causes of sunstroke in hot weather is an abnormal electric condition."

"There is ample scope for speculation in endeavoring to explain why the rays of the sun should have such a formidable power in arresting the functions of the nerve centres. Though heat has much to do with it, and though heat, it is well known, dilates the capillaries, I think I have given sufficient facts to show that there is another element present besides heat. This element, whatever it is, is contained in the sun's rays, which may explain the recognized fact that the occurrence of cases of sunstroke is affected by the electric condition of the atmosphere."

"The active agent in producing the disease is the direct rays of the sun acting either on the scalp, the nape of the neck, or as glare through the eyes. It is believed by many that exposure to a strong glare will of itself bring on sunstroke. It is quite certain that light is a most powerful irritant after it has been produced."

Dr. Thin adduces no other facts than those cited above in support of his hypothesis. We are disposed to regard electrical perturbations rather as a concurrence than as a cause of sunstroke, particularly on account of their being a constant periodical accompaniment of our hot season and not specially remarkable in summers distinguished by many sunstrokes. On the contrary, assuming to have been established the fact of the correlation or mutual convertibility of physical forces (a discovery declared by Sir William Armstrong the most remarkable one of the present century), the development of an excess of electricity would imply the abstraction of a certain quantity of heat, and involve a proportionate diminution of that power in the solar ray, which is assuredly the most important if not the only meteorological element concerned in the production of sunstroke. The creation of electricity may consequently, so far from having a baneful tendency, be nature's method of diverting and neutralizing to some extent the destructive agency of heat.

With respect to glare as another producing influence, we may similarly assume that it is simply a coincidence in localities whose surrounding surfaces (as in quarries) intensify solar heat by radiation and reflection. We are not aware of any authentic instance of "a strong glare" having "of itself" brought on sunstroke, although it is not improbable that it may induce cerebral disturbance of a different character from the disorder whose causes we have been considering.

Asiatic cholera was credited with three deaths during this quarter. It is unlikely, however, that the cases were genuine. Sporadic

cholera occurs more or less every summer, and being the naturalized offspring of its Eastern progenitor, can often be distinguished from the latter with difficulty. Degree of prevalence and not individual characteristics are mostly our only means of discrimination. Dr. J. M. Cuningham, Sanitary Commissioner with the Government of India, thus discusses this point in his last annual report:

"In the new rules the terms 'sporadic' and 'epidemic' have not been employed. Much evil has, I believe, resulted from the employment of these terms, and I have no hesitation in stating that they have proved a serious obstacle to a proper study of the disease. When a case of cholera occurs it is absolutely impossible for any medical officer, no matter of how great experience, to decide whether it is 'sporadic' or 'epidemic'—that is to say, whether it is a solitary seizure, holding a place by itself, unconnected with any other that may have already occurred or with any others that may follow, or whether it is a manifestation of some general influence which threatens to extend. On a merely local view individual cases may appear to be 'sporadic,' while an acquaintance with the general history of events will show that to regard them as such is both incorrect and unphilosophical."

FOURTH OR AUTUMNAL QUARTER OF 1870. THIRTEEN WEEKS, ENDING DECEMBER 31st.

During this quarter there were registered 3,887 births, and 2,192 marriages, and there occurred 5,949 deaths, being an increase, as compared with the summer quarter, of 339 births and 436 marriages, and a decrease of 2,467 deaths.

DEATHS OCCURRING EACH WEEK, BY CLASSES, FOR THE FOURTH QUARTER, ENDING DECEMBER 31,. 1870.

CLASSES.	WEEKS.													Total each Class.
	1	2	3	4	5	6	7	8	9	10	11	12	13	
	October 1st to October 8th.	8th to 15th.	15th to 22d.	22d to 29th.	29th to Nov. 5th.	5th to 12th.	12th to 19th.	19th to 26th.	26th to Dec. 3d.	3d to 10th.	10th to 17th.	17th to 24th.	24th to 31st.	
Zymotic	130	113	120	100	97	92	115	117	103	117	96	126	126	1452
Constitutional	125	110	146	106	124	115	119	126	131	113	118	108	118	1559
Local	129	149	190	158	153	170	188	178	200	203	187	196	197	2298
Developmental	29	34	36	28	34	29	25	26	29	34	30	29	39	402
Violence	14	21	13	13	14	16	26	22	17	22	26	10	24	238
Total	427	427	505	405	422	422	473	469	480	489	457	469	504	5949

Deaths in the City of New York from all Causes (in Quinquennial

MONTHS.	Nativity.				Colored.		Under 1 year.		1	
	United States		Foreign.							
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
October	566	514	369	315	11	15	277	224	96	75
November	539	512	407	328	13	17	218	189	80	59
December	794	690	500	415	17	19	300	233	112	83
Total	1,899	1,716	1,276	1,058	41	51	795	646	288	217
Percentage of deaths in each period of life on total mortality	31.92	28.84	21.45	17.78	.69	.86	13.36	10.86	4.84	3.65
Total of both sexes	3,615		2,334		92		1,441		505	
Percentage of both sexes on total mortality of quarter	60.76		39.23		1.55		24.22		8.49	

MONTHS.	35		40		45		50		55	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
October	54	49	53	40	51	31	41	30	30	28
November	51	50	58	46	47	31	42	29	26	26
December	57	63	66	56	75	47	52	44	50	19
Total	162	162	177	142	173	109	135	103	106	73
Percentage of deaths in each period of life on total mortality	2.73	2.73	2.97	2.39	2.91	1.83	2.27	1.73	1.78	1.23
Total of both sexes	324		319		282		238		179	
Percentage of both sexes on total mortality of quarter	5.46		5.36		4.74		4.00		3.01	

Periods) during the thirteen weeks ending Saturday, December 31, 1870.

2		3		4		Total under 5 years.		5		10		15		20		25		30	
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
26	35	9	18	11	15	419	367	21	18	15	12	21	27	42	22	60	48	47	53
42	48	21	25	23	15	384	336	32	33	16	10	22	19	47	38	56	54	58	55
76	64	48	44	24	26	560	450	43	33	17	22	31	34	50	65	75	63	73	63
144	147	78	87	58	56	1,363	1,153	96	84	48	44	74	80	139	135	191	165	178	163
2.42	2.47	1.31	1.46	.97	.94	22.90	19.40	1.61	1.41	.81	.74	1.24	1.34	2.34	2.27	3.21	2.77	2.99	2.13
291		165		111		2,516		180		92		154		274		356		316	
4.89		2.77		1.91		42.30		3.02		1.55		2.58		4.61		5.98		5.31	

60		65		70		75		80		85		90		95		100 and Upward.		Total by Sexes.		Total both Sexes.
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
25	26	18	16	19	24	8	11	5	10	3	9	1	....	2	1	....	....	935	829	1,764
27	28	30	22	23	26	8	15	8	10	4	7	4	2	1	2	2	1	946	840	1,786
41	38	44	25	29	28	17	25	6	15	5	11	1	3	2	....	....	1	1,294	1,105	2,399
93	92	92	63	71	78	33	51	19	35	12	27	6	5	5	3	2	2	3,175	2,774	5,949
1.56	1.55	1.55	1.06	1.19	1.31	.55	.86	.33	.58	.20	.45	.10	.08	.08	.05	.03	.03	53.37	46.63	100.00
185		155		149		84		54		39		11		8		4		5,949		
3.11		2.61		2.50		1.41		.91		.65		.18		.13		.06		100.00		

Meteorology.

The mean temperature of October was 58.40°, being 3.21° higher than that of any corresponding month for a period of eight years back, its average temperature for the previous ten years having been 54.07°.

Rain fell upon ten days of the month to the amount of 5.72 inches, its average rainfall for the previous ten years having been 4.24 inches. The mean reading of the barometer for October was 29.935, and the mean humidity 53.02.

The mean temperature of November was 46.53°, being nearly one degree above the temperature of any corresponding month for four years back, its average temperature for the previous ten years having been 43.32°. Rain or snow fell upon seven days of the month to the amount of 2.41 inches, its average rainfall for the previous ten years having been 4.71 inches. The mean reading of the barometer for November was 29.885, and the mean humidity 48.99.

The mean temperature of December was 35.85°, being .17° higher than that of any corresponding month for three years back, its average temperature for the previous ten years having been 33.48°. Snow or rain fell upon eleven days of the month to the amount of 2.83 inches, its average rainfall during the previous ten years having been 3.34 inches. The mean reading of the barometer for December was 29.863, and the mean humidity 53.82.

The mean temperature of the quarter was 46.93°, its average temperature for the ten previous years having been 43.63°. The maximum temperature was 78°, on October 1st, and the minimum 12°, on December 29th. Snow or rain fell upon twenty-eight days to the amount of 10.96 inches, the average rainfall of this quarter for the ten previous years having been 12.30 inches. The highest reading of the barometer was 30.403, on October 24th, and its lowest 29.347, on October 20th, its mean for the quarter being 29.894. The greatest degree of humidity was 84.93, on December 12th, and the least 18.63, on December 4th, its mean being 51.95.

A thunder-shower took place on November 3, and a violent gale on November 22.

The aurora borealis was visible on the nights of October 14, 24, and

25, being very beautiful on the two last nights. Shocks of an earthquake were experienced on the 20th of October at 11.15 A.M., with vibrations from east to west.

Mortality.

Five thousand nine hundred and forty-nine deaths occurred during this quarter, being a decrease of 2,467 upon the summer quarter, and an excess of 156 over the corresponding quarter of 1869. The principal mortuary features of this quarter were the large though not excessive mortality from zymotic affections, and the exceptional fatality of phthisis pulmonalis, which destroyed over 18 per cent. of all who died. 1,452 deaths were charged to zymotic diseases during the quarter, being more than for any autumnal quarter in five years past, although closely approached by those of 1866 and 1869.

Among the zymotic diseases, small-pox remained conspicuous for its inactivity, carrying off but twelve persons; a remarkable contrast to its ravages in the corresponding period of 1869. Not a single death was caused by it in October.

Measles became prominent during this season, having cut off 137 lives, an increase of 48 upon the previous three months. Scarlatina also evinced a tendency to spread, destroying 193 lives against 106 in the preceding quarter. Its mortality, however, was less by 30 than for the corresponding quarter of 1869.

Croup was unusually fatal, its deaths amounting to 152, being, with the exception of the spring quarter of 1869, its greatest quarterly mortality within six years. Only eighteen deaths were attributed to typhus fever, and the mortality from typhoid fever declined somewhat, especially toward the close of the year. Diarrhœal diseases continued to manifest a more than ordinary fatality, particularly in October, when the debilitating agencies of the summer were not yet in abeyance. 415 deaths were due to these causes, a number not exceeded in any former autumnal quarter since that of 1866, when still more depressing influences had been in operation.

Relapsing fever almost disappeared in this quarter, being credited with only eight deaths. Three deaths from yellow fever were reported in the month of October.

DEATHS FROM ZYMOTIC DISEASES.

NEW YORK.—DEATHS FROM SMALL-POX, MEASLES, SCARLATINA, DIPHTHERIA, WHOOPING-COUGH, TYPHOID FEVER, TYPHUS FEVER, CHOLERA INFANTUM, DIARRHŒAL MALADIES, YELLOW FEVER, AND OTHER ZYMOTIC DISEASES.

Registered during the thirteen weeks ending Saturday, December 31, 1870.

WARDS.	Small-pox.	Measles.	Scarlatina.	Diphtheria.	Croup.	Whooping-cough.	Typhus Fever.	Typhoid Fever.	Cholera Infantum.	Cholera-Morbus and Other Diarrhœal Diseases.	Yellow Fever.	Other Zymotic Diseases.	Total Deaths from Zymotic Diseases.	Total Deaths from all Causes.	Total Population (in Wards), Census of 1870.	Percentage of Zymotic deaths on total Mortality.	Death-rate per 1,000 Annually of the population from Zymotic Causes.	Death-rate per 1,000 Annually of the Population from all Causes.	REMARKS.
First	..	....	....	2	6	..	..	....	..	8	..	7	23	93	14,463	24.73	6.36	25.72	Castle Garden and E. Depot, 1.
Second	..	....	....	..	....	..	..	....	..	1	..	1	2	13	1,312	15.37	6.09	39.63	
Third	..	....	....	..	....	..	..	....	..	....	..	....	....	17	3,715	....	....	18.30	
Fourth	..	3	2	3	..	2	..	1	1	2	6	..	10	30	150	23,787	20.00	5.04	25.22	
Fifth	..	....	2	1	2	1	..	1	..	4	..	5	16	90	17,152	17.77	3.73	20.99	
Sixth	..	2	3	2	2	2	..	....	1	7	..	14	40	169	21,153	23.66	7.56	31.95	City Prison, 3; Reception Hospital, 19.
Seventh	..	5	2	5	5	5	..	2	1	12	..	14	51	223	44,819	21.88	4.55	20.79	
Eighth	..	2	2	1	2	1	..	3	2	12	..	9	34	184	34,913	18.47	3.89	21.08	
Ninth	..	6	19	5	8	..	1	8	1	10	..	10	68	255	47,607	26.66	5.71	21.42	St. Vincent's Hospital, 34.
Tenth	1	3	18	3	8	2	..	7	..	13	..	9	64	215	41,411	29.76	6.18	20.77	
Eleventh	..	20	15	5	16	..	3	10	2	12	..	8	91	381	64,230	23.87	5.66	23.73	St. Francis' Hospital, 33.
Twelfth	..	9	6	2	5	4	3	33	3	43	..	27	135	400	47,495	33.75	11.37	33.69	Ward's Island, 98; Randall's Island, 11; Bloomingdale Lunatic Asylum, 9; Infants' Hospital, 53; Idiot Asylum, 1; New York Juvenile Asylum, 2; House of Mercy, 2; House of Refuge, 1; House of Good Shepherd, 5; Deaf and Dumb Asylum, 10; Colored Orphan Asylum, 2; St. Joseph's Home, 3.
Thirteenth	..	12	6	2	9	1	..	2	1	12	1	5	51	196	33,365	26.02	6.11	23.50	
Fourteenth	..	3	6	3	9	2	1	1	2	8	..	11	46	177	26,431	25.98	6.96	26.79	
Fifteenth	..	....	....	2	4	..	..	2	2	73	..	19	102	226	27,586	45.13	14.79	32.77	Foundling Hospital, 134.
Sixteenth	..	6	3	6	4	3	..	6	1	5	1	9	44	226	48,360	19.46	3.64	18.69	
Seventeenth	..	23	25	5	16	5	..	11	4	30	..	13	132	529	95,411	24.95	5.53	22.18	
Eighteenth	..	11	11	2	9	2	1	....	1	7	..	18	62	303	59,598	20.46	4.16	20.33	
Nineteenth	11	1	36	8	13	3	5	22	6	59	..	29	193	811	86,055	23.79	8.97	37.70	Fever Hospital, 11; German Hospital, 20; Woman's Hospital, 5; Work-house, 14; Roman Catholic Orphan Asylum, 1; City Lunatic Asylum, 25; Almshouse, 34; Penitentiary, 4; Small-pox, 11; Charity Hospital, 161; Epileptic and Paralytic Hospital, 9; Colored Home Hospital, 28; Nursery and Child's Hospital, 28; St. Luke's Hospital, 34.
Twentieth	..	27	21	9	13	3	1	5	1	14	..	28	122	459	75,318	26.57	6.48	24.38	Mount Sinai Hospital, 9.
Twenty-first	..	....	3	3	4	1	..	....	1	13	1	25	51	477	56,709	10.69	3.59	33.65	Bellevue Hospital, 280; Home of the Friendless, 1.
Twenty-second	..	4	13	9	8	4	2	5	3	32	..	15	95	345	71,362	27.53	5.32	19.34	
Totals	12	197	193	78	152	39	18	119	34	381	3	286	1,452	5,949	942,252	24.40	6.16	25.25	Total Deaths in Public Institutions, 1,106.

Meteorological Observations, by Weeks, for the Twelve Months ending December 31, 1870. Condensed from Daily Observations of Professor Oran W. Morris, Observer in New York for the Smithsonian Institute.

DATE. — WEEK ENDING.	MEAN TEMPERATURE (FAHRENHEIT SCALE).	GREATEST DAILY RANGE OF TEMPERATURE IN THE WEEK.	AVERAGE HUMIDITY, SATURATION BEING 100°.	TOTAL RAINFALL (INCHES OF WATER).	MEAN PRESSURE OF THE ATMOSPHERE.	PREVALENT WINDS.	REMARKS CONCERNING THE GENERAL ASPECTS OF THE WEATHER.
Eight days ending—							
January 8, 1870	33.89	14.0	72.36	1.85	29.73	N.W.	Rain on three days. Snow on one day. Aurora Borealis on the 2d and 3d of the month.
" 15, "	34.07	23.3	76.79	.04	30.04	S.W.	Snow on one day. Solar and lunar halo on the 9th. Lunar halo on the 11th. Hail on the 14th.
" 22, "	28.90	14.0	74.09	.25	30.13	N.W.	Lunar halo on the 16th. Lunar corona on the 19th. Rain on one day.
" 29, "	41.77	17.0	67.06	2.53	29.86	N.E.	Rain on three days. Solar halo on the 27th.
Average for the month (31 days).	36.93	.....	72.57	5.03	29.92		
February 5, 1870	20.66	18.0	73.41	.07	29.96	N.E.	Snow on one day. Aurora Borealis on the 1st. Lunar halo on the 5th.
" 12, "	31.97	11.9	72.15	1.64	29.67	N.W.	Snow and hail on one day. Snow on one day. Rain on one day. Lunar halo on the 11th.
" 19, "	36.45	20.0	67.32	1.84	29.81	S.E.	Rain on four days. Snow on one day. Lunar halo on the 13th.
" 26, "	24.58	21.4	58.87	.70	29.65	N.W.	Rain on two days. Solar halo on the 26th.
Average for the month (28 days).	30.78	.....	67.91	4.47	29.74		
March 5, 1870	29.86	10.2	53.76	.41	29.68	N.W.	Rain on one day. Snow on five days.
" 12, "	31.21	14.0	65.51	.68	29.75	N.E.	Snow on three days. Aurora Borealis on the 9th. Solar halo on the 10th.
" 19, "	33.74	16.6	52.49	1.72	29.60	N.	Gale (snow and rain) on the 13th. Snow on two days. Zodiacal light on the 18th and 19th.
" 26, "	40.01	17.5	43.74	.06	29.97	N.W.	Rain on two days. Aurora Borealis on the 21st and 25th.
Average for the month (31 days).	25.55	.....	52.91	4.17	29.76		

DATE. — WEEK ENDING.	MEAN TEMPERATURE (FAHRENHEIT SCALE).	GREATEST DAILY RANGE OF TEMPERATURE IN THE WEEK.	AVERAGE HUMIDITY, SATURATION BEING 100.	TOTAL RAINFALL (DEPTH OF WATER).	MEAN PRESSURE OF THE ATMOSPHERE.	PREVALENT WINDS.	REMARKS.
October 8, 1870	61.02	17.0	57.56	.68	29.921	N.E.	Rain on two days.
" 15, "	61.86	24.3	52.11	2.63	29.871	S.W.	Rain on three days. Aurora Borealis on the 14th.
" 22, "	57.44	26.0	54.49	1.2	29.872	S.W.	Rain on three days. Earthquake on the 20th at 11:15 A.
" 29, "	53.87	20.0	51.43	.27	30.125	N.W.	Rain on two days. Meteor on the 25th. Aurora Borealis on the 25th.
Average for the month (31 days).	58.41	.....	53.02	5.72	29.935		
November 5, 1870	52.40	20.0	50.49	1.19	29.863	S.W.	Rain on three days. Thunder-shower on the 3d of November. Lunar corona on the 4th.
" 12, "	49.54	27.0	42.08	.26	29.953	N.W.	Rain on one day. Lunar corona on the 6th. Meteors on the 9th and 10th.
" 19, "	41.46	22.0	47.81	.....	29.892	N.W.	Slight rain and slight snow on one day.
" 26, "	42.83	14.0	52.62	1.09	29.872	W.	Rain on three days. Gale on the 22d.
Average for the month (30 days).	46.53	.....	48.99	2.41	29.885		
December 3, 1870	47.13	24.0	46.22	.....	29.892	N.W.	Slight rain on one day. Two meteors on November 27.
" 10, "	47.18	12.8	47.53	.01	29.791	N.W.	Rain on two days. Lunar corona on the 8th.
" 17, "	38.05	14.0	58.28	.09	29.863	N.W.	Rain on two days. Snow-flakes scattering on two days
" 24, "	29.42	30.0	54.19	.75	29.661	N.W.	Snow and rain on one day.
" 31, "	27.64	24.0	60.92	1.08	29.908	N.W.	Snow on two days.
Average for the month (31 days).	35.85	.....	53.82	2.83	29.863		

Consolidated Abstract of Deaths in New York, from all Causes, Registered for the Twelve Months ending December 31, 1870.

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class I.																												
ZYMOTIC DISEASES.																												
ORDER 1. (*Miasmatic.*)																												
Small-pox and Varioloid	101	89	66	37	3	....	32	37	17	10	10	13	9	7	7	4	75	71	15	13	1	1	7	6	14	6	16	9
Varicella	3	6	....	....	....	1	1	5	1	1	....	....	....	....	....	....	2	6	1	....	....	....	....	....	....	....	....	....
Measles	153	124	12	9	....	....	42	22	57	51	36	28	10	15	8	6	153	122	11	9	....	1	....	....	....	....	....	....
Scarlatina	460	436	39	40	1	....	39	43	102	88	92	110	82	90	61	46	376	377	104	80	12	8	2	2	3	6	2	2
Diphtheria	144	143	11	10	2	....	21	15	42	31	32	29	19	29	12	11	126	115	21	28	2	2	1	1	2	....	2	....
Croup (Membranous)	200	204	9	8	....	....	27	35	66	55	42	48	34	28	21	25	190	191	18	20	1	....	....	....	....	1	....	....
Quinsy (Tonsillitis)	10	4	1	2	....	....	2	....	5	1	1	3	....	1	....	....	8	5	....	....	1	....	....	....	....	....	1	....
Parotitis	1	....	....	1	....	....	....	....	....	....	1	1	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....
Whooping Cough	74	118	5	4	....	....	44	61	16	38	11	14	6	4	1	4	78	121	1	1	....	....	....	....	....	....	....	....
Typhus Fever	17	11	46	22	1	1	....	1	....	....	1	....	3	....	2	....	6	1	4	1	3	2	1	5	8	6	10	3
Typhoid Fever	80	80	145	117	1	5	2	3	....	2	3	5	1	2	5	4	11	16	8	14	19	14	19	25	35	18	28	23
Erysipelas	48	37	23	15	1	....	34	30	3	1	1	....	1	....	....	....	39	31	....	1	1	....	....	....	1	1	2	2
Puerperal Fever	....	15	....	48	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	....	13	....	17
Pyæmia	8	7	17	20	....	....	3	3	....	....	....	1	....	1	....	....	3	5	....	1	2	2	1	1	2	5	6	3
Septicæmia	....	2	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Carbuncle	1	2	7	5	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Hospital Gangrene	....	1	1	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Dysentery	60	76	85	88	....	....	26	30	15	21	4	4	1	2	2	5	48	62	5	4	3	3	1	3	3	5	9	8
Diarrhœa	1033	973	116	94	11	8	787	708	240	228	31	27	4	5	4	4	1066	972	10	2	1	1	1	....	4	1	2	6
Cholera (Asiatic)	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" (Sporadic)	1	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....
" Morbus	4	6	29	22	....	1	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	1	1	2	2	1	1
" Infantum	587	610	16	15	3	7	460	497	126	110	13	15	3	1	....	1	602	624	1	1	....	....	....	....	....	....	....	....
Entero-colitis	75	55	7	1	....	1	65	41	15	13	2	....	....	1	....	....	82	55	....	....	....	....	....	....	....	1	....	....
Cerebro-spinal Meningitis	15	10	4	3	....	....	6	3	2	4	2	....	....	....	1	....	10	8	1	1	1	....	1	....	2	....	....	1
Remittent Fever	51	44	24	28	3	4	3	3	13	2	5	7	4	5	2	2	27	19	5	5	4	2	3	8	5	4	5	8
Intermittent Fever	13	17	20	16	1	....	2	7	2	3	1	2	1	....	....	....	6	12	3	1	2	2	1	1	4	1	2	2
Yellow Fever	2	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	1
Relapsing Fever	31	23	78	52	5	3	1	....	....	1	1	1	....	....	....	....	2	2	3	3	1	3	6	3	8	6	4	8
Total Miasmatic Diseases	5173	3093	763	662	34	29	1597	1545	722	660	289	308	178	191	125	116	2911	2817	213	186	54	41	45	63	95	76	91	95

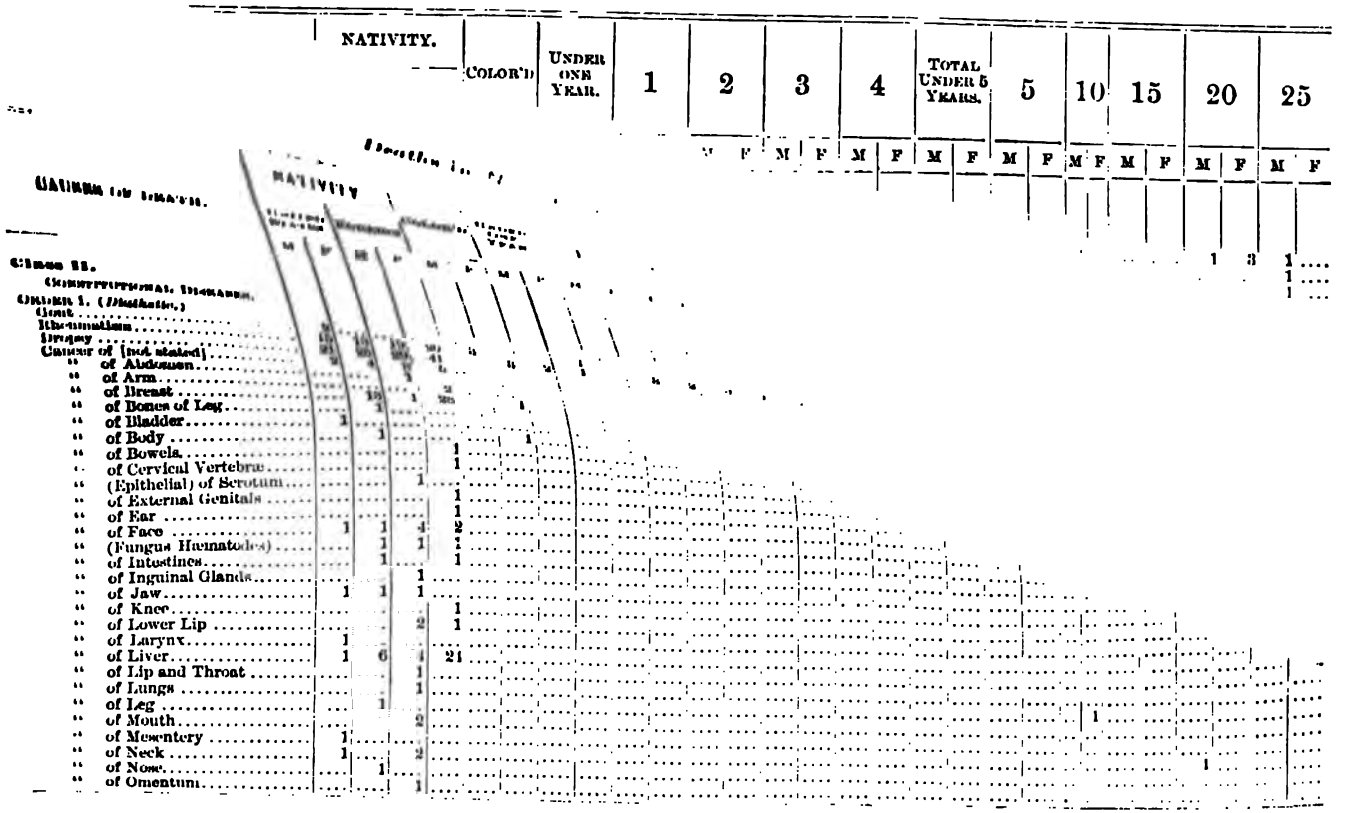
CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE ON TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Class I.																																		
ZYMOTIC DISEASES.																																		
ORDER 1. (*Miasmatic.*)																																		
Small-pox and Varioloid	13	9	8	....	7	4	4	2	3	2	4	1	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	167	126	293	1.07
Varicella	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	6	9	.03
Measles	....	1	....	....	1	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	165	133	298	1.09
Scarlatina	....	....	....	....	....	1	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	499	476	975	3.58
Diphtheria	....	3	....	1	....	1	1	....	....	....	....	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	155	153	308	1.13
Croup (Membranous)	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	209	212	421	1.54
Quinsy (Tonsillitis)	....	....	....	....	....	....	....	....	....	....	....	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11	6	17	.06
Parotitis	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2	.007
Whooping Cough	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	79	122	201	.73
Typhus Fever	6	3	5	5	6	3	6	2	1	2	2	..	1	..	3	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	63	33	96	.35
Typhoid Fever	11	21	22	19	21	10	8	5	13	5	8	5	10	8	3	5	5	6	1	5	..	..	..	..	..	..	..	..	..	..	225	197	422	1.55
Erysipelas	6	2	1	4	4	2	2	....	5	2	1	..	3	..	3	3	1	1	2	1	..	..	..	..	..	..	..	..	..	..	71	50	121	.44
Puerperal Fever	....	14	....	9	....	3	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	63	63	.23
Pyæmia	....	5	4	2	2	1	2	1	3	....	....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	25	27	52	.19
Septicæmia	1	1	....	2	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	4	5	.01
Carbuncle	....	....	....	....	....	....	1	....	1	3	2	1	1	1	1	1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	8	7	15	.05
Hospital Gangrene	1	....	....	....	....	2	....	1	....	....	....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	4	5	.01
Dysentery	9	10	7	6	8	9	12	4	8	10	4	7	10	7	5	7	4	10	7	3	2	5	..	..	..	1	..	..	..	..	145	164	309	1.13
Diarrhœa	6	5	7	11	3	9	7	6	5	8	7	3	6	5	1	10	12	12	6	10	4	3	1	3	..	..	..	..	..	..	1149	1067	2216	8.15
Cholera (Asiatic)	....	....	....	....	....	....	1	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	....	1	.003
" (Sporadic)	....	....	....	....	....	....	....	....	....	....	....	....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3	.01
" Morbus	2	1	4	5	4	....	6	2	2	2	4	5	2	1	1	2	..	2	1	2	1	2	..	..	..	..	..	..	..	..	33	28	61	.22
" Infantum	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	603	625	1228	4.51
Entero-colitis	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	82	56	138	.51
Cerebro-spinal Meningitis	1	2	1	1	....	....	....	....	....	....	....	....	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	19	13	32	.17
Remittent Fever	5	3	4	3	3	3	1	4	3	5	4	4	2	2	..	2	3	..	1	..	..	..	..	..	..	..	..	..	..	..	75	72	147	.54
Intermittent Fever	1	....	2	....	4	2	....	....	2	2	....	1	2	2	2	3	1	1	1	3	..	..	..	..	..	..	..	..	..	..	53	33	66	.24
Yellow Fever	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3	.01
Relapsing Fever	8	13	16	12	10	8	10	4	13	5	10	3	8	1	5	2	3	1	2	..	..	1	..	..	..	..	..	..	..	..	1.09	75	184	.67
Total Miasmatic Diseases	73	93	81	80	73	58	61	29	59	46	46	34	48	28	25	55	29	35	23	24	8	11	1	3	..	1	..	..	..	..	3986	3755	7691	28.30

Deaths in New York—(Continued).

CAUSES OF DEATH.	NATIVITY.				COLOR.		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class I.—*Continued.*																												
ORDER 2. (*Enthetic or Inoculated.*)																												
Syphilis	58	39	3	6	6	4	53	36	1	1	....	....	....	....	....	....	54	37	....	....	1	..	....	....	1	3	1	....
Glanders	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	1	....
Malignant Pustule	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	1	....
Hydrophobia	3	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	1	....	..	..	1	....	....	....	....	....
Total Enthetic or Inoculated Diseases	63	39	3	7	6	4	53	36	1	1	....	....	1	....	....	....	55	37	1	....	1	..	1	....	1	3	3	....
ORDER 3. (*Dietic.*)																												
Inanition	76	90	8	8	2	1	79	90	2	2	....	....	....	....	....	....	81	92	....	1	..	..	....	....	....	1	....	....
Scurvy	....	1	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Purpura	8	4	5	5	....	....	4	2	1	....	1	....	....	....	....	....	6	2	....	....	..	..	....	....	1	2	....	....
Alcoholism { Intemperance	31	16	105	65	3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	2	....	4	3	18	12
Alcoholism { Delirium Tremens	17	1	58	14	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	1	1	....	10	3
Total Dietic Diseases	132	112	171	93	6	3	8	92	3	2	1	....	....	....	....	....	87	94	....	1	..	..	2	1	6	6	28	15
ORDER 4. (*Parasitic.*)																												
Hydatid of Uterus	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
" of Liver	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	1	....	....	....	....	....
Total Parasitic Diseases	1	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	1	....	....	....	....	....
Total Zymotic Class	3369	3245	937	763	46	36	1733	1673	726	663	290	308	179	191	125	113	3053	2948	214	187	55	41	49	64	102	85	122	110

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE ON TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Class I.—*Continued.*																																		
ORDER 2. (*Enthetic or Inoculated.*)																																		
Syphilis	1	1	....	....	....	....	2	2	....	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	61	45	106	.35
Glanders	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	....	1	.003
Malignant Pustule	....	....	....	....	....	1	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	1	2	.007
Hydrophobia	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	3	....	3	.01
Total Enthetic or Inoculated Diseases	1	1	....	....	....	1	2	2	....	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	66	46	112	.41
ORDER 3. (*Dietic.*)																																		
Inanition	....	2	....	....	....	....	....	1	1	....	....	..	..	..	1	..	..	1	..	..	..	..	1	..	..	..	..	..	....	..	84	98	182	.67
Scurvy	....	....	....	....	....	....	....	1	....	....	....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	....	2	2	.007
Purpura	....	1	1	2	....	1	1	1	1	....	....	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	....	..	13	9	22	.07
Alcoholism { Intemperance	16	15	18	15	23	13	14	11	14	5	10	2	8	2	3	3	3	..	1	..	1	..	1	..	..	..	..	..	....	..	136	81	217	.79
Alcoholism { Delirium Tremens	9	4	12	4	14	1	10	1	7	1	5	..	2	.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	70	15	85	.31
Total Dietic Diseases	25	22	31	21	37	15	25	15	23	6	15	3	11	2	5	3	4	1	1	..	1	..	2	..	..	..	..	..	....	..	303	205	508	1.86
ORDER 4. (*Parasitic.*)																																		
Hydatid of Uterus	....	....	....	....	....	1	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	....	1	1	.003
" of Liver	....	....	....	....	....	....	....	....	....	....	....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	1	2	.007
Total Parasitic Diseases	....	....	....	....	....	1	....	....	....	....	....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	2	3	.01
Total Zymotic Class	99	116	113	101	110	75	88	46	83	54	62	38	59	30	30	38	33	36	24	24	9	11	3	3	....	1	....	....	....	....	4306	4008	8314	30.60

Deaths in New York—(Continued).



	NATIVITY.		COLOR'D	UNDER ONE YEAR.	1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
					M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Cancer of (not stated)																					1	3	1	
" of Abdomen																							1	
" of Arm																							1	
" of Breast																								
" of Bones of Leg																								
" of Bladder																								
" of Body																								
" of Bowels																								
" of Cervical Vertebræ																								
" (Epithelial) of Scrotum																								
" of External Genitals																								
" of Ear																								
" of Face																								
" (Fungus Hæmatodes)																								
" of Intestines																								
" of Inguinal Glands																								
" of Jaw																								
" of Knee																								
" of Lower Lip																								
" of Larynx																								
" of Liver																								
" of Lip and Throat																								
" of Lungs																								
" of Leg																								
" of Mouth																								
" of Mesentery																								
" of Neck																								
" of Nose																								
" of Omentum																								

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE ON TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F			
Class II.																																	
CONSTITUTIONAL DISEASES.																																	
ORDER 1. (*Diathetic.*)																																	
Gout	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2	...	2	.007
Rheumatism	1	2	4	1	4	5	5	5	4	3	2	2	3	3	2	1	3	1	1	...	...	...	...	...	...	...	...	...	24	33	57	.34
Dropsy	1	1	4	4	5	6	7	5	5	5	8	5	5	5	1	4	4	3	6	1	1	2	...	...	...	...	...	...	50	66	116	.42
Cancer of [not stated]	1	...	1	2	1	1	1	...	2	3	2	...	1	...	1	1	...	...	1	...	...	...	...	...	...	...	...	...	10	9	19	.06
" of Abdomen	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	.003
" of Arm	...	...	...	...	...	...	1	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	2	.007
" of Breast	...	5	1	2	...	6	...	7	...	5	...	6	...	...	4	...	2	...	1	...	1	...	...	...	1	...	...	...	1	41	42	.15
" of Bones of Leg	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	.003
" of Bladder	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	.003
" of Body	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	.003
" of Bowels	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	.003
" of Cervical Vertebræ	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	.003
" (Epithelial) of Scrotum	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	.003
" of External Genitals	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	1	.003
" of Ear	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	.003
" of Face	...	1	...	1	...	1	...	1	...	...	1	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	3	5	8	.02
" (Fungus Hematodes)	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	3	4	.01
" of Intestines	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	2	2	4	.007
" of Inguinal Glands	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	.003
" of Jaw	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	2	1	3	.01
" of Knee	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	.003
" of Lower Lip	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	.01
" of Larynx	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	3	.01
" of Liver	...	2	...	2	...	1	...	2	...	4	...	2	5	4	2	5	1	3	1	1	...	...	...	...	...	...	...	...	1	1	2	.003
" of Lip and Throat	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	25	30	55	.20
" of Lungs	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	.003
" of Leg	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	.003
" of Mouth	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2	1	3	.01
" of Mesentery	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	.003
" of Neck	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	3	.01
" of Nose	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	.003
" of Omentum	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	.003

DEATHS FROM ZYMOTIC DISEASES.

NEW YORK.—DEATHS FROM SMALL-POX, MEASLES, SCARLATINA, DIPHTHERIA, WHOOPING-COUGH, TYPHOID FEVER, TYPHUS FEVER, CHOLERA INFANTUM, DIARRHŒAL MALADIES, YELLOW FEVER, AND OTHER ZYMOTIC DISEASES.

Registered during the thirteen weeks ending Saturday, December 31, 1870.

WARDS.	Small-pox.	Measles.	Scarlatina.	Diphtheria.	Croup.	Whooping-cough.	Typhus Fever.	Typhoid Fever.	Cholera Infantum.	Cholera Morbus and Other Diarrhœal Diseases.	Yellow Fever.	Other Zymotic Diseases.	Total Deaths from Zymotic Diseases.	Total Deaths from all Causes.	Total Population (in Wards), Census of 1870.	Percentage of Zymotic deaths on total Mortality.	Death-rate per 1,000 Annually of the population from Zymotic Causes.	Death-rate per 1,000 Annually of the Population from all Causes.	REMARKS.
First	..	....	....	2	6	..	..	....	..	8	..	7	23	93	14,463	24.73	6.36	25.72	Castle Garden and E. Depot, 1.
Second	..	....	....	..	....	..	..	....	..	1	..	1	2	13	1,312	15.37	6.09	39.63	
Third	..	....	....	..	....	..	..	....	..	....	..	....	....	17	3,715	.....	.....	18.30	
Fourth	..	3	2	3	2	..	1	1	2	6	..	10	30	150	23,787	20.00	5.04	25.22	
Fifth	..	....	2	1	2	1	..	1	..	4	..	5	16	90	17,152	17.77	3.73	20.99	
Sixth	..	2	3	2	2	2	..	....	1	7	..	14	40	169	21,153	23.66	7.56	31.95	City Prison, 3; Reception Hospital, 19.
Seventh	..	5	2	5	5	5	..	2	1	12	..	14	51	233	44,819	21.88	4.55	20.79	
Eighth	..	2	2	1	2	1	..	3	2	12	..	9	34	184	34,913	18.47	3.89	21.08	
Ninth	..	6	19	5	8	..	1	8	1	10	..	10	68	255	47,607	26.66	5.71	21.42	St. Vincent's Hospital, 34.
Tenth	1	3	18	3	8	2	..	7	..	13	..	9	64	215	41,411	29.76	6.18	20.77	
Eleventh	..	20	15	5	16	..	3	10	2	12	..	8	91	381	64,230	23.87	5.66	23.73	St. Francis' Hospital, 33.
Twelfth	..	9	6	2	5	4	3	33	3	43	..	27	135	400	47,495	33.75	11.37	33.69	Ward's Island, 98; Randall's Island, 11; Bloomingdale Lunatic Asylum, 9; Infants' Hospital, 5; Idiot Asylum, 1; New York Juvenile Asylum, 2; House of Mercy, 2; House of Refuge, 1; House of Good Shepherd, 5; Deaf and Dumb Asylum, 10; Colored Orphan Asylum, 2; St. Joseph's Home, 3.
Thirteenth	..	12	6	2	9	1	..	2	1	12	1	5	51	196	33,365	26.02	6.11	23.50	
Fourteenth	..	3	6	3	9	2	1	1	2	8	..	11	46	177	26,431	25.98	6.96	26.79	
Fifteenth	..	....	....	2	4	..	..	2	2	73	..	19	102	226	27,586	45.13	14.79	32.77	Foundling Hospital, 134.
Sixteenth	..	6	3	6	4	3	..	6	1	5	1	9	44	226	48,360	19.46	3.61	18.69	
Seventeenth	..	23	25	5	16	5	..	11	4	30	..	13	132	529	95,411	24.95	5.53	22.18	
Eighteenth	..	11	11	2	9	2	1	....	1	7	..	18	62	303	59,598	20.46	4.16	20.33	
Nineteenth	11	1	36	8	13	3	5	22	6	59	..	29	193	811	86,055	23.79	8.97	37.70	Fever Hospital, 11; German Hospital, 20; Woman's Hospital, 5; Work-house, 14; Roman Catholic Orphan Asylum, 1; City Lunatic Asylum, 35; Almshouse, 34; Penitentiary, 4; Small-pox, 11; Charity Hospital, 161; Epileptic and Paralytic Hospital, 9; Colored Home Hospital, 28; Nursery and Child's Hospital, 28; St. Luke's Hospital, 34.
Twentieth	..	27	21	9	13	3	1	5	1	14	..	28	122	459	75,318	26.57	6.48	24.38	Mount Sinai Hospital, 9.
Twenty-first	..	....	3	3	4	1	..	....	1	13	1	25	51	477	50,709	10.69	3.59	33.65	Bellevue Hospital, 280; Home of the Friendless, 1.
Twenty-second	..	4	13	9	8	4	2	5	3	32	..	15	95	345	71,362	27.53	5.32	19.34	
Totals	12	187	193	78	152	39	18	119	34	381	3	286	1,452	5,949	942,252	24.40	6.16	25.25	Total Deaths in Public Institutions, 1,106.

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE ON TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F			
Class II.—*Continued.* CONSTITUTIONAL DISEASES.																																	
ORDER 1. (*Diathetic.*)																																	
Cancer of Ovaries								1				1																		2	2		.007
" of Parotid						2		1						1															3	1	4		.01
" of Peritoneum	1									1																			2		2		.007
" of Palate and Tonsils												1																	1		1		.003
" of Rectum		1		1	1			2						1															3	6	9		.03
" of Spleen																													1	1	1		.003
" of Shoulder									1																						1		.003
" of Stomach	2	1	3	2	4	5	9	5	9		10	9	7	4	2	1	2	1	2	1									36	51	87		.29
" of Scalp															1														3	1	4		.003
" of Tongue	1									1																			3		3		.01
" of Throat										1		1																	1		1		.003
" of Uterus		9		7		10		13		1		8		3		4		3		3		2							1	80	80		.29
" of Vagina						1								1																2	2		.007
Noma (Cancrum Oris)																													1	6	7		.02
Lupus Exedens											1						1												2	1	3		.01
Exophthalmia																														1	1		.003
Total Diathetic Diseases	11	23	14	24	15	37	38	43	24	48	20	37	30	27	12	25	8	15	5	17	1	4	2	2	1	1			199	353	552		2.02
ORDER 2. (*Tubercular.*)																																	
Scrofula											1				1														33	31	64		.23
Lumbar Abscess (Psoas, etc.)		1		2													1												9	4	13		.04
Tabes Mesenterica (including Marasmus)	1		1			1		2		1		2		3		3		4		2	6	1	1						451	408	859		3.16
Phthisis Pulmonalis	273	237	226	238	196	181	190	124	152	117	108	74	83	67	64	45	43	34	15	15	4	10	3	5	2	2			2097	1993	4090		14.83
Hydrocephalus																			1										369	274	643		1.25
Tubercular Meningitis	5								1		1																		91	78	169		.62
Total Tubercular Diseases	279	238	227	240	196	182	190	126	155	118	111	75	86	69	67	49	44	39	16	17	10	11	4	6	2	2			3050	2728	5778		21.36
Total from Constitutional Class	290	261	241	264	211	219	218	169	179	166	131	112	116	96	79	74	52	54	21	32	11	15	9	8	3	3	1		3249	3080	6329		23.29

Deaths in New York—(Continued).

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class II.—*Continued.* CONSTITUTIONAL DISEASES.																												
ORDER 1. (*Diathetic.*)																												
Cancer of Ovaries	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" of Parotid	....	1	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" of Peritoneum	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" of Palate and Tonsils	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" of Rectum	1	4	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
" of Spleen	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....
" of Shoulder	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" of Stomach	8	12	28	39	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
" of Scalp	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" of Tongue	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" of Throat	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" of Uterus	....	27	....	53	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	4
" of Vagina	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Noma (Cancrum Oris)	1	6	....	....	....	....	....	1	1	....	....	1	....	2	....	1	1	5	....	1	....	....	....	....	....	....	....	....
Lupus Exedens	1	1	1	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Exophthalmia	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Total Diathetic Diseases	61	122	138	230	3	6	3	3	1	3	2	4	1	4	3	2	10	16	3	2	3	9	5	4	4	5	4	12
ORDER 2. (*Tubercular.*)																												
Scrofula	30	27	3	4	1	....	21	15	....	4	1	4	....	1	2	1	27	25	2	2	1	..	....	2	1	....	2	....
Lumbar Abscess (Psoas, etc.)	5	1	6	3	....	....	1	....	....	1	....	....	....	....	1	....	2	1	1	....	..	..	1	....	....	....	2	....
Tabes Mesenterica (including Marasmus)	420	386	31	22	2	7	333	299	72	64	19	18	5	4	4	1	425	386	4	4	2	1	2	....	2	....	....	....
Phthisis Pulmonalis	682	644	1415	1289	64	47	22	16	32	21	19	17	8	8	3	6	84	68	17	21	23	31	83	125	231	268	200	271
Hydrocephalus	154	266	15	5	8	2	173	125	102	90	45	21	21	13	9	8	350	257	16	12	2	3	....	1	....	....	....	....
Tubercular Meningitis	82	76	9	2	....	....	30	28	17	21	14	9	8	5	4	7	73	70	7	3	4	4	....	....	....	1	....	....
Total Tubercular Diseases	1571	1400	1479	1328	75	56	573	483	223	201	98	69	42	31	23	23	959	807	47	42	33	39	86	128	234	269	304	271
Total from Constitutional Class	**1632**	**1522**	**1617**	**1558**	**78**	**62**	**576**	**486**	**224**	**204**	**100**	**73**	**43**	**35**	**26**	**25**	**969**	**823**	**50**	**44**	**36**	**48**	**91**	**132**	**238**	**274**	**308**	**283**

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE ON TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F			
Class II.—*Continued.* CONSTITUTIONAL DISEASES.	290	291	241	264	211	219	218	169	179	166	131	114	116	96	79	74	58	54	34	21	11	12	9	8	3	2	1		3249	3080	6329	23.29
ORDER 1. (*Diathetic.*)																																
Cancer of Ovaries	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	.007
" of Parotid	....	....	....	....	....	....	2	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	1	4	.01
" of Peritoneum	1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	2	.007
" of Palate and Tonsils	....	....	....	1	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.003
" of Rectum	....	1	....	1	....	....	....	....	2	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	3	6	9	.03
" of Spleen	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.003
" of Shoulder	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	.003
" of Stomach	2	1	3	....	4	5	9	5	9	....	7	10	9	7	4	2	1	2	1	....	1	....	....	....	....	....	....	....	36	61	97	.33
" of Scalp	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.003
" of Tongue	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	3	.01
" of Throat	....	....	....	....	....	....	1	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.003
" of Uterus	....	9	....	7	....	10	....	13	....	1	....	8	....	3	....	4	....	3	....	3	....	2	....	....	....	....	....	....	1	80	80	.29
" of Vagina	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	.007
Noma (Cancrum Oris)	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	6	7	.02
Lupus Exedens	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	2	1	3	.01
Exophthalmia	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	.003
Total Diathetic Diseases	11	23	14	24	15	37	38	43	24	48	20	37	30	27	19	25	8	15	5	17	1	4	2	2	1	2	1	....	199	352	551	2.02
ORDER 2. (*Tubercular.*)																																
Scrofula	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	33	31	64	.23
Lumbar Abscess (Psoas, etc.)	....	1	....	2	....	....	....	....	1	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	9	4	13	.04
Tabes Mesenterica (including Marasmus)	1	....	1	....	....	1	....	2	1	1	2	....	3	2	3	3	4	....	2	1	6	1	1	....	....	....	....	....	451	408	859	3.16
Phthisis Pulmonalis	273	327	236	238	196	181	190	124	152	117	108	74	83	67	64	45	43	34	15	15	4	10	3	5	2	....	....	....	3997	1933	4030	14.83
Hydrocephalus	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	389	274	643	1.26
Tubercular Meningitis	5	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	91	78	169	.62
Total Tubercular Diseases	279	328	250	240	211	196	228	169	179	166	131	114	116	96	79	74	58	54	34	21	11	12	9	8	3	2	1	....	5950	2728	8778	21.36
Total from Constitutional Class	290	291	241	264	211	219	218	169	179	166	131	114	116	96	79	74	58	54	34	21	11	12	9	8	3	2	1		3249	3080	6329	23.29

Consolidated Abstract of Deaths in New York, from all Causes, Registered for the Twelve Months ending December 31, 1870.

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class I.																												
ZYMOTIC DISEASES.																												
ORDER 1. (*Miasmatic.*)																												
Small-pox and Varioloid	101	89	66	37	3	....	32	37	17	10	10	13	9	7	7	4	75	71	15	13	1	1	7	6	14	6	16	9
Varicella	3	6	....	....	....	1	1	5	1	1	....	....	....	....	....	....	2	6	1	....	..	1	....	....	....	....	....	....
Measles	153	124	12	9	....	....	42	22	57	51	36	28	10	15	8	6	153	122	11	9	..	1	....	....	....	....	....	....
Scarlatina	460	436	39	40	1	....	39	43	102	88	92	110	82	90	61	46	376	377	104	80	12	8	2	2	3	6	2	2
Diphtheria	144	143	11	10	2	....	21	15	42	31	32	29	19	29	12	11	126	115	21	28	2	2	1	1	2	....	2	....
Croup (Membranous)	200	204	9	8	....	....	27	35	66	55	42	48	34	28	21	25	190	191	18	20	1	..	....	....	....	1	....	....
Quinsy (Tonsilitis)	10	4	1	2	....	....	2	....	5	1	1	3	....	1	....	....	8	5	....	....	1	..	....	....	....	....	1	....
Parotitis	1	....	....	1	....	....	....	....	....	....	1	1	....	....	....	....	1	1	....	....	..	..	....	....	....	....	....	....
Whooping Cough	74	118	5	4	....	....	44	61	16	38	11	14	6	4	1	4	78	121	1	1	..	..	....	....	....	....	....	....
Typhus Fever	17	11	46	22	1	1	....	1	....	....	1	....	3	....	2	....	6	1	4	1	3	2	1	5	8	6	10	3
Typhoid Fever	80	80	145	117	1	5	2	3	....	2	3	5	1	2	5	4	11	16	8	14	19	14	19	25	35	18	28	23
Erysipelas	48	37	23	13	1	....	34	30	3	1	1	....	1	....	....	....	39	31	....	1	1	..	....	....	1	1	2	2
Puerperal Fever	....	15	....	48	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	7	....	13	....	17
Pyæmia	8	7	17	20	....	....	3	3	....	....	....	1	....	1	....	....	3	6	...	1	2	2	1	1	2	5	6	3
Septicæmia	....	2	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	1
Carbuncle	1	2	7	5	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	..	..	....	....	....	....	....	....
Hospital Gangrene	....	1	1	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Dysentery	60	76	85	88	....	....	26	20	15	21	4	4	1	2	2	5	48	62	5	4	3	3	1	3	3	5	9	8
Diarrhœa	1033	973	116	94	11	8	787	708	240	228	31	27	4	5	4	4	1066	972	10	2	1	1	1	....	4	1	2	6
Cholera (Asiatic)	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
" (Sporadic)	1	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	..	..	....	....	....	....	1	....
" Morbus	4	6	29	22	....	1	....	....	....	....	....	....	....	....	....	....	....	....	2	....	..	..	1	1	2	2	1	1
" Infantum	587	610	16	15	3	7	460	497	126	110	13	15	3	1	....	1	602	624	1	1	..	..	....	....	....	....	....	....
Entero-colitis	75	55	7	1	....	1	65	41	15	13	2	....	....	1	....	....	82	55	....	....	..	..	....	....	....	1	....	....
Cerebro-spinal Meningitis	15	10	4	3	....	....	6	3	2	4	2	....	....	....	....	1	10	8	1	1	1	..	1	....	2	....	....	1
Remittent Fever	51	44	24	28	3	4	3	3	13	2	5	7	4	5	2	2	27	19	5	5	4	2	3	3	5	4	5	8
Intermittent Fever	13	17	20	16	1	....	2	7	2	3	1	2	1	....	....	....	6	12	3	1	2	2	1	1	4	1	2	2
Yellow Fever	2	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	2	....	....	1
Relapsing Fever	31	23	78	52	5	3	1	....	....	1	1	1	....	....	....	....	2	2	3	3	1	3	6	3	8	6	4	8
Total Miasmatic Diseases	3173	3093	763	662	34	29	1597	1545	722	660	289	308	178	191	125	113	2911	2817	213	186	54	43	45	63	95	76	91	95

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE ON TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Class III.																																		
LOCAL DISEASES.																																		
ORDER 1. (*Nervous.*)																																		
Meningitis	10	2	8	2	10	1	6	8	5	5	4	4	4	..	3	2	2	4	2	1	..	1	1	1	..	..	..	1	....	..	437	313	750	2.75
Encephalitis	2	4	3	1	3	....	5	....	1	....	1	..	1	1	..	1	..	1	..	..	..	1	..	..	..	..	..	..	....	..	35	54	139	.51
Softening of Brain	3	4	4	1	9	2	5	3	4	4	7	4	8	4	3	2	8	3	..	2	1	..	2	4	..	..	..	..	....	..	67	39	106	.39
Apoplexy	15	5	15	15	21	11	17	16	18	15	25	14	26	25	21	17	22	14	7	13	2	8	4	2	1	1	..	..	....	..	214	177	391	1.44
Insanity	3	2	4	3	3	4	3	2	4	8	2	1	3	..	..	..	1	1	..	..	..	..	..	2	..	..	..	..	....	..	30	31	61	.22
Epilepsy	7	4	5	5	1	4	2	1	2	3	2	2	..	..	..	2	..	1	..	..	1	..	..	..	..	..	..	..	....	..	35	37	72	.26
Convulsions	....	....	....	1	....	....	....	....	....	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	563	440	1003	3.09
Paralysis	4	....	4	4	4	9	5	7	6	1	10	3	3	5	6	3	5	10	5	8	5	2	1	2	..	..	1	..	....	..	61	64	125	.45
Paraplegia	....	1	....	....	1	1	....	....	2	....	2	..	2	..	..	1	2	..	1	..	..	..	1	..	..	..	..	..	....	..	13	3	16	.05
Hemiplegia	2	1	1	1	....	2	3	....	1	1	2	..	1	1	..	3	1	2	..	4	2	2	..	1	1	..	..	..	1	..	15	21	36	.15
Locomotor Ataxia	....	....	....	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	2	....	2	.007
Chorea	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	..	2	1	3	.01
Tetanus	....	1	....	....	3	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	11	6	17	.06
Trismus Nascentium	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	26	20	46	.16
Congestion of Brain	10	7	5	2	5	3	4	7	3	2	3	1	2	3	..	1	..	2	..	1	..	2	..	..	..	..	..	..	....	..	121	116	237	.87
Abscess "	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	2	....	2	.007
Tumor "	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	1	1	2	.007
Myelitis	....	....	....	....	3	1	1	....	1	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	11	5	16	.05
Laryngismus Stridulus	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	8	3	11	.04
Tabes Dorsalis	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	1	....	1	.003
Coma	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	1	....	1	.003
Direct Effect of Solar Heat	27	9	20	11	29	6	19	4	13	1	8	2	10	4	1	3	2	..	..	3	..	..	..	..	1	..	..	..	....	..	181	57	238	.87
Total Diseases of Nervous System	83	41	69	46	94	44	70	48	61	41	69	32	61	44	35	35	43	38	15	32	11	16	9	13	3	1	1	1	1	..	1887	1388	3275	12.05
ORDER 2. (*Circulatory.*)																																		
Pericarditis	3	2	6	6	5	5	6	6	3	3	4	1	3	4	1	2	1	3	..	1	1	..	..	..	..	..	..	..	....	..	54	52	106	.39
Aneurism of Heart	1	1	....	....	....	....	1	....	....	....	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	6	1	7	.02
" Aorta	9	2	10	1	7	....	6	2	7	2	4	..	2	1	2	1	1	..	1	..	..	..	..	..	..	..	..	..	....	..	55	13	68	.25
" Popliteal Artery	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	1	....	1	.003
" Abdominal	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	1	....	1	.003
Hypertrophy of the Heart	4	4	3	5	6	6	5	8	10	3	3	3	6	4	9	3	3	4	1	1	..	1	1	..	..	..	..	..	....	..	63	57	120	.44
Valvular Disease of the Heart	12	14	14	13	11	8	9	8	8	6	4	5	4	7	12	5	3	4	5	5	2	2	1	1	..	..	..	..	....	..	116	121	237	.87
Ossification of the Heart	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	..	....	2	.. 2	.007
" Coronary Arteries	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	..	2	....	2	.007

Deaths in New York—(Continued).

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class III.—*Continued.*																												
ORDER 2. (*Circulatory.*)																												
Embolism of Heart	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Endo-cardlitis	5	3	3	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	3	1	1	....	1	....	....	1
Fatty Degeneration of the Heart	9	11	7	18	2	1	....	....	1	....	....	....	....	....	....	....	....	1	....	....	..	..	....	....	....	....	....	2
Syncope	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	..	..	....	....	....	....	....	....
Angina Pectoris	2	4	5	2	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	..	..	....	....	....	....	1	....
Disease of the Heart	35	23	50	39	1	3	3	....	....	1	1	....	....	....	....	....	4	1	3	3	4	4	4	2	5	3	4	2
Thrombosis	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	1	....
Hemorrhage from Varicose Vein	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
" (internal)	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Epistaxis	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	..	..	....	....	....	....	....	....
Phlebitis	....	1	3	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	1	1	2
Total Dis. Circulatory System	160	152	261	212	9	13	4	3	....	3	2	....	1	....	4	....	11	6	11	16	14	27	17	15	18	17	55	25
ORDER 3. (*Respiratory.*)																												
Laryngitis	34	29	3	4	....	....	5	11	6	4	9	4	5	6	2	2	27	27	4	2	..	..	1	....	2	....	....	1
Bronchitis	334	325	79	117	3	7	243	186	52	60	23	28	3	10	5	6	326	290	7	10	..	1	....	3	4	2	1	4
Pneumonia	655	531	391	259	19	25	295	225	146	118	49	40	24	23	13	6	527	412	25	19	6	7	10	20	34	13	28	32
Pleuritis	10	13	37	16	2	2	....	4	....	1	1	....	....	2	1	1	2	8	4	1	1	1	2	2	4	1	2	....
" Hydrothorax	9	6	9	11	1	1	....	....	1	....	....	....	....	2	....	....	1	2	1	1	..	..	2	....	1	1	1	1
" Empyema	5	1	3	1	2	....	1	....	....	....	1	....	....	....	....	....	1	1	....	....	1	..	1	....	2	1	1	....
Cirrhosis of Lungs	....	1	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	..	..	....	....	....	....	....	....
Gangrene "	2	3	5	2	....	....	....	1	....	1	....	....	....	1	....	....	....	3	....	....	..	..	1	....	1	....	....	....
Congestion "	63	54	38	27	1	1	26	34	10	7	10	5	2	2	1	2	49	50	7	1	..	..	....	1	....	1	1	3
Hemorrhage "	9	6	14	10	1	....	3	....	....	....	....	....	....	....	....	....	3	....	....	....	1	..	1	1	2	1	2	1
Œdema Glottidis	1	2	1	1	....	....	1	2	....	....	....	....	....	....	....	....	1	2	....	....	..	..	....	....	....	....	....	....
Emphysema (Asthma)	5	8	24	14	....	....	....	3	1	1	....	....	....	....	1	....	2	4	....	....	1	..	....	....	....	1	....	1
Total Dis. of Respiratory System	1127	979	604	458	29	36	574	466	216	192	92	78	34	47	23	17	939	800	48	34	10	9	18	27	50	21	36	43

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE OF TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Class III.—*Continued.*																																		
ORDER 2. (*Circulatory.*)																																		
Embolism of Heart	....	1	....	..	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	....	....	....	2	2	.007
Endo-carditis	1	....	....	1	....	1	....	2	1	1	....	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	8	8	16	.05
Fatty Degeneration of the Heart	....	1	2	3	3	3	2	3	2	....	....	..	1	7	1	2	..	5	1	2	4	..	..	..	..	..	..	..	....	....	16	29	45	.16
Syncope	....	....	....	....	....	....	....	....	....	1	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	2	2	.007
Angina Pectoris	....	1	....	....	....	....	....	....	....	....	2	..	..	..	..	2	..	..	..	1	..	..	2	..	..	..	..	..	....	....	7	6	13	.04
Disease of the Heart	5	5	14	5	7	2	5	5	6	4	3	2	8	5	5	6	4	7	1	5	2	1	1	..	..	..	..	..	....	....	85	62	147	.54
Thrombosis	....	....	....	....	....	....	....	....	....	....	....	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	2	....	2	.007
Hemorrhage from Varicose Vein	....	....	....	....	....	1	....	....	....	1	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	2	2	.007
" (Internal)	....	....	....	....	....	....	1	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	1	....	1	.008
Epistaxis	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	1	....	1	.003
Phlebitis	....	2	2	....	....	1	....	....	....	....	....	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	3	7	10	.03
Total Dis. Circulatory System.	36	33	51	34	40	27	35	34	37	21	21	11	25	30	34	22	12	24	9	15	9	6	6	1	..	..	..	..	....	....	421	364	785	2.88
ORDER 3. (*Respiratory.*)																																		
Laryngitis	1	....	....	2	....	....	2	....	....	....	....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	37	33	70	.26
Bronchitis	3	4	4	4	4	9	6	7	8	4	7	9	8	13	12	20	9	26	6	15	6	10	1	8	..	3	1	..	....	....	413	442	855	3.14
Pneumonia	50	25	52	45	53	35	46	20	55	18	44	31	38	31	36	26	16	23	17	18	5	9	1	5	3	1	..	..	....	....	1046	790	1836	6.75
Pleuritis	3	....	4	3	4	1	3	1	2	2	1	1	6	2	1	2	3	1	1	2	1	1	1	..	1	..	1	..	....	....	47	29	76	.27
" Hydrothorax	1	2	1	1	3	3	1	....	1	1	1	1	1	2	1	..	1	1	..	..	1	1	..	..	..	..	..	..	....	....	18	17	35	.12
" Empyema	1	....	....	....	....	....	1	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	8	2	10	.03
Cirrhosis of Lungs	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	1	1	0.03
Gangrene "	....	1	2	....	1	....	....	....	....	....	....	..	1	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	....	....	7	5	12	.04
Congestion "	5	2	5	2	3	2	5	....	3	3	4	4	7	2	6	2	3	1	1	1	2	1	..	1	..	..	..	..	....	....	101	77	178	.65
Hemorrhage "	5	2	1	1	1	2	4	2	1	2	....	..	..	2	..	1	1	..	..	1	..	..	1	..	..	..	..	..	....	....	23	16	39	.14
Œdema Glottidis	....	....	....	....	....	....	1	1	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	2	3	5	.01
Emphysema (Asthma)	1	....	4	1	3	1	1	3	2	3	4	1	1	1	3	1	1	4	4	..	1	1	1	..	..	..	..	..	....	....	29	22	51	.18
Total Dis. of Respiratory System	70	36	73	59	72	55	70	34	72	33	61	48	62	53	59	53	34	56	29	37	17	25	5	14	4	4	2	.	..	....	1731	1437	3168	11.65

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class III.—*Continued.*																												
ORDER 4. (*Digestive.*)																												
Stomatitis	6	6	....	....	....	....	5	4	1	2	....	....	....	....	....	....	6	6	....	....	..	..	....	....	....	....	....	....
Pharyngitis	1	1	1	....	....	....	1	1	....	....	....	....	....	....	1	....	2	1	....	....	..	..	....	....	....	....	....	....
Œsophagitis	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	..	..	....	....	....	....	....	....
Stricture of Œsophagus	....	....	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Gangrene of Throat	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	..	..	....	....	....	....	....	....
Gastritis	44	42	37	51	1	4	22	16	6	4	4	4	1	1	1	1	34	26	3	5	1	2	....	3	5	2	....	5
Enteritis	153	100	24	26	4	2	113	66	13	16	7	2	1	2	1	1	135	87	6	4	3	3	....	2	3	1	....	2
Gastro-enteritis	104	93	7	11	....	2	92	78	5	4	....	1	3	....	....	....	100	83	....	....	..	1	....	....	....	1	....	4
Ulcer of the Stomach	5	1	7	12	2	....	2	....	....	....	....	....	....	....	....	....	2	....	....	....	..	..	....	....	....	....	1	1
Hæmatemesis	5	5	8	2	1	....	....	2	....	....	....	....	....	1	....	....	....	3	....	....	..	..	....	....	2	....	....	....
Hemorrhage of Bowels	4	1	1	....	....	....	2	1	....	....	....	....	....	....	....	....	2	1	....	....	..	..	....	....	....	....	....	....
Peritonitis	52	58	37	78	2	6	8	5	1	1	....	2	1	1	2	....	12	9	6	2	7	3	7	7	12	28	6	15
Ulceration of Intestines	3	3	1	2	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	1	..	....	....	1	....	....	1
Intussusception "	8	3	6	1	1	....	5	1	1	....	....	....	....	....	....	....	6	1	....	....	..	..	....	....	1	....	....	....
Gangrene "	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Stricture "	1	....	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
" Ductus Com. Choledocus	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Hernia (Strangulated)	5	3	15	15	....	....	5	....	....	....	....	....	....	....	....	....	5	....	....	....	..	..	....	....	2	....	....	....
Colic (Lead)	1	1	2	2	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	..	..	....	....	....	....	1	....
Perforation of Vermiform Appendix	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	1	....
Ascites	2	5	5	11	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	..	..	....	1	....	2	....	....
Hypertrophy of Liver	3	1	4	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	1	....	....	....	....	....
Fatty degeneration of Liver	3	5	12	7	2	1	....	1	1	....	....	....	....	....	....	....	1	1	....	....	.	..	....	....	2	....	1	....
Cirrhosis "	16	10	53	41	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	3	3	1	1
Hepatitis	11	15	39	46	....	....	2	....	5	....	1	....	1	....	....	1	9	1	....	....	..	..	....	1	1	1	3	3
Abscess of Liver	1	....	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	1	....	....	....	1	....
Jaundice	14	22	4	5	....	1	14	18	....	....	....	1	....	....	....	....	14	19	....	....	..	..	....	1	....	1	....	....
Disease of Liver	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Splenitis	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	1	....	....	....
Rupture of Spleen	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Leucocythemia	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Sub-peritoneal Tumor	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Stricture of Rectum	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Fistula in Ano	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	..	..	....	....	....	....	....	....
Hæmorrhoids	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Prolapsus Ani	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Total Dis. of Digestive System	446	378	275	318	13	18	271	196	53	27	12	10	7	5	5	3	398	241	18	11	12	9	9	15	23	39	15	32

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		Total by Sexes.		Total both Sexes.	Percentage of each Cause on Total.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F			
Class III.—*Continued.*																																	
ORDER 4. (*Digestive.*)																																	
Stomatitis	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6	6	12		.04
Pharyngitis	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	3		.01
Œsophagitis	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1		.003
Stricture of Œsophagus	....	....	....	....	....	....	1	....	1	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	4		.01
Gangrene of Throat	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1		.003
Gastritis	....	5	6	9	6	2	4	5	6	4	2	4	2	5	4	5	2	7	3	2	2	2	....	....	1	....	....	....	81	93	174		.64
Enteritis	6	4	7	3	3	4	1	1	1	4	3	2	1	4	5	....	....	2	2	2	1	1	....	....	....	....	....	....	177	126	303		1.11
Gastro-enteritis	2	3	1	1	....	....	1	4	....	1	2	....	1	4	2	....	1	....	....	3	1	....	....	....	....	....	....	....	111	104	215		.79
Ulcer of the Stomach	....	2	1	1	2	1	1	1	5	3	....	2	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	12	13	25		.09
Hæmatemesis	1	....	....	1	3	1	1	1	3	....	1	....	....	....	1	....	....	....	....	....	1	1	....	....	....	....	....	....	13	7	20		.07
Hemorrhage of Bowels	....	....	1	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	1	6		.02
Peritonitis	6	10	6	23	7	8	3	6	2	6	3	5	4	6	4	3	1	3	1	1	1	1	1	1	....	....	....	....	89	136	225		.82
Ulceration of Intestines	....	....	....	1	1	....	....	1	....	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	4	5	9		.03
Intussusception "	3	....	1	1	1	1	....	....	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	14	4	18		.06
Gangrene "	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1		.003
Stricture "	1	....	1	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	1	4		.01
" Ductus Com. Choledocus	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1		.003
Hernia (Strangulated)	2	1	1	1	3	4	2	3	....	2	....	1	2	4	2	1	2	1	....	....	....	....	....	....	....	....	....	....	20	18	38		.13
Colic (Lead)	....	....	1	....	....	....	....	....	1	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	3	6		.02
Perforation of Vermiform Appendix	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1		.003
Ascites	....	3	3	....	....	....	....	2	1	....	....	3	2	2	1	1	..	1	..	1	....	....	....	....	....	....	....	....	7	16	23		.08
Hypertrophy of Liver	1	1	1	....	2	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	2	9		.03
Fatty degeneration of Liver	1	1	....	2	4	4	3	....	1	1	1	1	....	....	1	....	....	....	....	1	....	1	....	....	....	....	....	....	15	12	27		.09
Cirrhosis "	5	2	8	6	11	11	9	5	9	5	9	6	3	2	7	3	3	5	1	1	....	....	1	....	....	....	....	....	69	51	120		.44
Hepatitis	4	3	7	6	5	5	4	8	3	4	4	7	6	7	2	7	..	5	..	2	2	..	....	1	....	....	....	....	50	61	111		.40
Abscess of Liver	....	....	....	1	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	2	5		.01
Jaundice	....	1	2	1	....	....	....	1	....	1	1	1	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	18	27	45		.16
Disease of Liver	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1		.003
Splenitis	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1		.003
Rupture of Spleen	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1		.003
Leucocythemia	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	2		.007
Sub-peritoneal Tumor	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1		.03
Stricture of Rectum	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1		.03
Fistula in Ano	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1		.03
Hæmorrhoids	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1		.03
Prolapsus Ani	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....		
Total Dis. of Digestive System	32	37	47	57	48	41	33	40	25	34	29	34	23	38	33	23	9	24	7	12	8	6	1	3	1	....	....	....	721	696	1417		5.21

Deaths in New York—(Continued).

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class III.—*Continued.*																												
ORDER 2. (*Circulatory.*)																												
Embolism of Heart	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Endo-carditis	5	3	3	5	....	....	....	....	....	1	....	....	....	....	....	....	....	1	....	....	3	1	1	....	1	....	....	1	....
Fatty Degeneration of the Heart	9	11	7	18	2	1	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	2
Syncope	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....
Angina Pectoris	2	4	5	2	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....
Disease of the Heart	35	23	50	39	1	3	5	....	1	1	....	....	....	....	....	....	4	1	3	3	4	4	4	2	5	3	4	2	....
Thrombosis	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....
Hemorrhage from Varicose Vein	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" (internal)	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Epistaxis	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Phlebitis	....	1	3	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	1	2
Total Dis. Circulatory System	160	152	261	212	9	13	4	3	....	3	2	....	1	....	4	....	11	6	11	16	14	27	17	15	18	17	55	25	....
ORDER 3. (*Respiratory.*)																													
Laryngitis	34	29	3	4	....	....	5	11	6	4	9	4	5	6	2	2	27	27	4	2	..	..	1	....	2	....	....	1	....
Bronchitis	334	225	79	117	3	7	249	186	52	60	23	28	3	10	5	6	326	260	7	10	..	1	....	3	4	2	1	4	....
Pneumonia	655	531	391	259	19	25	295	225	146	118	49	40	24	23	13	6	527	412	25	19	6	7	10	20	34	13	28	32	....
Pleuritis	10	13	37	16	2	2	....	4	....	1	1	....	....	2	1	1	2	8	4	1	1	1	2	2	4	1	2	....	....
" Hydrothorax	9	6	9	11	1	1	....	....	1	....	....	....	....	2	....	....	1	2	1	1	..	..	2	....	1	1	1	1	....
" Empyema	5	1	3	1	2	....	1	....	....	....	....	1	....	....	....	....	1	1	....	....	1	..	1	....	2	1	1	....	....
Cirrhosis of Lungs	....	1	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	..	..	....	....	....	....	....	....	....
Gangrene "	2	3	5	2	....	....	....	1	....	1	....	....	....	1	....	....	3	3	....	....	..	..	1	....	1	....	....	....	....
Congestion "	63	54	38	23	1	1	26	34	10	7	10	5	2	2	1	2	49	50	7	1	..	..	....	1	....	1	1	3	....
Hemorrhage "	9	6	14	10	1	....	3	....	....	....	....	....	....	....	....	....	3	....	....	....	1	..	1	1	2	1	2	1	....
Œdema Glottidis	1	2	1	1	....	....	1	2	....	....	....	....	....	....	....	....	1	2	....	....	..	..	....	....	....	....	....	....	....
Emphysema (Asthma)	5	8	24	14	....	....	....	3	1	1	....	....	....	....	1	....	2	4	....	....	1	..	....	....	....	....	1	....	1
Total Dis. of Respiratory System	1127	979	604	458	29	36	574	466	216	192	92	78	34	47	23	17	939	800	48	34	10	9	18	27	50	21	36	43	....

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE OF TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F			
Class III.—*Continued.*																																	
ORDER 2. (*Circulatory.*)																																	
Embolism of Heart	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	2	2	.007
Endo-carditis	1	....	....	1	....	1	....	2	1	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	8	8	16	.05
Fatty Degeneration of the Heart	....	1	2	3	3	3	2	3	2	....	....	....	1	7	1	2	..	5	1	2	4	..	..	..	..	..	..	..	..	..	16	29	45	.16
Syncope	....	....	....	....	....	....	....	....	....	1	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	2	2	.007
Angina Pectoris	....	1	....	....	....	....	....	....	....	....	2	....	..	..	2	3	..	..	..	1	..	..	2	..	..	..	..	..	..	..	7	6	13	.04
Disease of the Heart	5	5	14	5	7	2	5	5	6	4	3	2	8	5	5	6	4	7	1	5	2	1	1	..	..	..	..	..	..	..	85	62	147	.54
Thrombosis	....	....	....	....	....	....	....	....	....	....	....	....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	....	2	.007
Hemorrhage from Varicose Vein	....	....	....	....	....	1	....	....	....	1	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	2	2	.007
" (Internal)	....	....	....	....	....	....	1	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	....	1	.003
Epistaxis	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	....	1	.003
Phlebitis	....	2	2	....	....	1	....	....	....	....	....	....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	7	10	.03
Total Dis. Circulatory System.	36	33	51	34	40	27	35	34	37	21	21	11	25	30	34	22	12	24	9	15	9	6	6	1	..	..	..	..	..	..	421	364	785	2.88
ORDER 3. (*Respiratory.*)																																	
Laryngitis	1	....	....	2	....	....	2	....	....	....	....	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	37	33	70	.26
Bronchitis	3	4	4	4	4	9	6	7	8	4	7	9	8	13	12	20	9	26	6	15	6	10	1	8	..	3	1	..	..	..	413	442	855	3.14
Pneumonia	50	25	52	45	53	35	46	20	55	18	44	31	38	31	36	26	16	23	17	18	5	9	1	5	3	1	..	..	..	..	1046	790	1836	6.75
Pleuritis	3	....	4	3	4	1	3	1	2	2	1	1	6	2	1	2	3	1	1	2	1	1	1	..	1	..	1	..	..	..	47	29	76	.27
" Hydrothorax	1	2	1	1	3	3	1	....	1	1	1	1	1	2	1	..	1	1	..	..	1	1	..	..	..	..	..	..	..	..	18	17	35	.12
" Empyema	1	....	....	....	....	....	1	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	2	10	.03
Cirrhosis of Lungs	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	1	1	0.03
Gangrene "	....	1	2	....	1	....	....	....	....	....	....	....	1	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	7	5	12	.04
Congestion "	5	2	5	2	3	2	5	....	3	3	4	4	7	2	6	2	3	1	1	1	2	1	..	1	..	..	..	..	..	..	101	77	178	.65
Hemorrhage "	5	2	1	1	1	2	4	2	1	2	....	....	..	2	..	1	1	..	..	1	..	..	1	..	..	..	..	..	..	..	23	16	39	.14
Œdema Glottidis	....	....	....	....	....	....	1	1	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	3	5	.01
Emphysema (Asthma)	1	....	4	1	2	1	1	3	2	3	4	1	1	1	3	1	1	4	4	..	1	1	1	..	..	..	..	..	..	..	29	22	51	.18
Total Dis. of Respiratory System	70	36	73	59	72	53	70	34	72	33	61	48	62	53	59	53	34	56	29	37	17	23	5	14	4	4	2	..	..	..	1731	1437	3168	11.65

Deaths in New York—(Continued).

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class III.—*Continued.*																												
ORDER 4. (*Digestive.*)																												
Stomatitis	6	6	....	....	....	....	5	4	1	2	....	....	....	....	....	....	6	6	....	....	..	..	....	....	....	....	....	....
Pharyngitis	1	1	1	....	....	....	1	1	....	....	....	....	....	....	1	....	2	1	....	....	..	..	....	....	....	....	....	....
Œsophagitis	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	..	..	....	....	....	....	....	....
Stricture of Œsophagus	....	....	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Gangrene of Throat	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	..	..	....	....	....	....	....	....
Gastritis	44	42	37	51	1	4	22	16	6	4	4	4	1	1	1	1	34	26	3	5	1	2	....	3	5	2	....	5
Enteritis	153	100	24	26	4	2	113	66	13	16	7	2	1	2	1	1	135	87	6	4	3	3	....	2	3	1	....	2
Gastro-enteritis	104	93	7	11	....	2	92	78	5	4	....	1	3	....	....	....	100	83	....	....	..	1	....	....	....	1	....	4
Ulcer of the Stomach	5	1	7	12	2	....	2	....	....	....	....	....	....	....	....	....	2	....	....	....	..	..	....	....	....	....	1	1
Hæmatemesis	5	5	8	2	1	....	....	2	....	....	....	....	....	1	....	....	....	3	....	....	..	..	....	....	2	....	....	....
Hemorrhage of Bowels	4	1	1	....	....	....	2	1	....	....	....	....	....	....	....	....	2	1	....	....	..	..	....	....	....	....	....	....
Peritonitis	52	58	37	78	2	6	8	5	1	1	....	2	1	1	2	....	12	9	6	2	7	3	7	7	12	28	6	15
Ulceration of Intestines	3	3	1	2	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	1	..	....	....	1	....	....	1
Intussusception "	8	3	6	1	1	....	5	1	1	....	....	....	....	....	....	....	6	1	....	....	..	..	....	....	1	....	....	....
Gangrene "	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Stricture "	1	..	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
" Ductus Com. Choledocus	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Hernia (Strangulated)	5	3	15	15	....	....	5	....	....	....	....	....	....	....	....	....	5	....	....	....	..	..	....	....	2	....	....	....
Colic (Lead)	1	1	2	2	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	..	..	....	....	....	....	1	....
Perforation of Vermiform Appendix	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	1	....
Ascites	2	5	5	11	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	..	..	....	1	....	2	....	....
Hypertrophy of Liver	3	1	4	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	1	....	....	....	....	....
Fatty degeneration of Liver	3	5	12	7	2	1	....	1	1	....	....	....	....	....	....	....	1	1	....	....	.	..	....	....	2	....	1	....
Cirrhosis "	16	10	53	41	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	3	3	1	1
Hepatitis	11	15	39	46	....	....	2	....	5	....	1	....	1	....	....	1	9	1	....	....	..	..	....	1	1	1	3	3
Abscess of Liver	1	....	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	1	....	....	....	1	....
Jaundice	14	22	4	5	....	1	14	18	....	....	....	1	....	....	....	....	14	19	....	....	..	..	....	1	....	1	....	....
Disease of Liver	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Splenitis	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	1	....	....	....
Rupture of Spleen	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Leucocythemia	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Sub-peritoneal Tumor	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Stricture of Rectum	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Fistula in Ano	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	..	..	....	....	....	....	....	....
Hæmorrhoids	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Prolapsus Ani	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Total Dis. of Digestive System	446	378	275	318	13	18	271	196	53	27	12	10	7	5	5	3	328	241	18	11	12	9	9	15	23	39	15	22

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE ON TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Class III.—*Continued.*																																		
ORDER 4. (*Digestive.*)																																		
Stomatitis	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6	6	12		.04
Pharyngitis	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	3		.01
Œsophagitis	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1		.003
Stricture of Œsophagus	....	....	....	....	....	....	1	....	1	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	4		.01
Gangrene of Throat	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1		.003
Gastritis	....	5	6	9	6	2	4	5	6	4	2	4	2	5	4	5	2	7	3	2	2	2	..	1	....	....	....	....	81	98	174		.64
Enteritis	6	4	7	3	3	4	1	1	1	4	3	2	1	4	5	..	2	2	2	1	1	..	..	..	....	....	....	....	177	120	303		1.11
Gastro-enteritis	2	3	1	1	....	....	1	4	....	1	2	..	1	4	2	..	1	..	..	2	1	..	..	..	....	....	....	....	111	104	215		.79
Ulcer of the Stomach	....	2	1	1	2	1	1	1	5	3	....	2	..	1	..	1	..	..	..	..	..	..	..	..	....	....	....	....	12	13	25		.09
Hæmatemesis	1	....	....	1	3	1	1	1	3	....	1	..	..	..	1	..	..	..	..	..	1	1	..	..	....	....	....	....	13	7	20		.07
Hemorrhage of Bowels	....	....	1	....	....	....	....	....	....	....	2	..	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	5	1	6		.02
Peritonitis	6	10	6	22	7	8	3	6	2	6	3	5	4	6	4	3	1	3	1	1	1	1	1	1	....	....	....	....	89	136	225		.82
Ulceration of Intestines	....	....	....	1	1	....	....	1	....	1	....	1	..	..	1	..	..	..	..	..	..	..	..	..	....	....	....	....	4	5	9		.03
Intussusception "	3	....	1	1	1	1	....	....	2	1	....	....	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	14	4	18		.06
Gangrene "	....	....	....	....	....	....	1	....	....	....	....	1	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	....	1	1		.003
Stricture "	1	....	1	....	....	....	1	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	3	1	4		.01
" Ductus Com. Choledocus	....	....	....	....	....	....	....	....	....	....	....	....	..	..	1	..	..	..	..	..	..	..	..	..	....	....	....	....	1	....	1		.003
Hernia (Strangulated)	2	1	1	1	2	4	2	3	....	2	....	1	2	4	2	1	2	1	..	..	..	..	..	..	....	....	....	....	20	18	38		.13
Colic (*Lead*)	....	....	1	....	....	....	....	....	1	....	....	....	..	2	..	..	..	..	..	..	..	..	..	..	....	....	....	....	3	3	6		.02
Perforation of Vermiform Appendix	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	1	....	1		.003
Ascites	....	3	2	....	....	....	....	2	1	....	....	3	2	2	1	1	..	1	..	1	..	..	..	..	....	....	....	....	7	16	23		.08
Hypertrophy of Liver	1	1	1	....	2	....	1	....	....	....	1	..	1	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	7	2	9		.03
Fatty degeneration of Liver	1	1	....	2	4	4	3	....	1	1	1	1	..	1	..	..	..	..	1	..	1	..	..	..	....	....	....	....	15	12	27		.09
Cirrhosis "	5	2	8	6	11	11	9	5	2	5	2	6	3	2	7	3	3	5	1	1	..	..	1	..	....	....	....	....	69	51	120		.44
Hepatitis	4	3	7	6	5	5	4	8	3	4	4	7	6	7	2	7	..	5	..	2	2	..	1	..	....	....	....	....	50	61	111		.40
Abscess of Liver	....	....	....	1	....	....	1	1	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	3	2	5		.01
Jaundice	....	1	2	1	....	....	....	1	....	1	1	1	1	..	..	1	..	..	..	..	..	..	..	..	....	....	....	....	18	27	45		.16
Disease of Liver	....	....	....	....	....	....	....	....	....	1	....	....	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	....	1	1		.003
Splenitis	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	1	....	1		.003
Rupture of Spleen	....	....	....	....	....	....	....	....	....	....	....	....	..	..	1	..	..	..	..	..	..	..	..	..	....	....	....	....	1	....	1		.003
Leucocythemia	....	....	1	....	1	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	2	....	2		.007
Sub-peritoneal Tumor	....	....	....	1	....	....	....	....	....	....	....	....	..	..	1	..	..	..	..	..	..	..	..	..	....	....	....	....	....	1	1		.03
Stricture of Rectum	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	1	....	1		.03
Fistula in Ano	....	....	....	....	....	....	....	....	....	....	....	....	1	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	1	....	1		.03
Hæmorrhoids	....	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	....	1	1		.03
Prolapsus Ani	....	1	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	....	....	....	....	....	....	....		
Total Dis. of Digestive System	32	37	47	57	48	41	33	60	35	34	29	34	23	38	33	23	9	24	7	12	8	6	1	3	1	....	....	....	721	696	1417		5.21

Deaths in New York—(Continued).

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class III.—*Continued.*																												
ORDER 5. (*Urinary.*)																												
Nephritis	21	17	36	19	....	....	4	2	2	1	3	3	5	2	4	3	18	11	7	3	2	1	....	....	1	1	2	3
Nephria (Bright's Disease)	159	115	273	240	25	23	2	2	5	1	5	1	4	2	4	4	20	10	7	2	7	3	14	10	25	33	29	33
Congestion of Kidney	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Uremia	13	19	14	16	1	1	1	1	....	1	....	1	2	2	....	....	3	5	....	1	..	1	1	1	1	3	3	4
Diabetes	6	5	8	5	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	1	1	2	1
Addison's Disease	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Calculus	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
" of Bladder	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
" (Lithotomy)	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Cystitis	10	1	17	7	....	1	....	1	....	....	....	....	....	....	....	....	....	1	....	....	..	..	....	....	....	....	....	....
Gangrene of Perineum	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Abscess "	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Retention of Urine	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	1	....	....	....
Suppression of Urine	....	2	2	1	....	....	....	1	....	1	....	....	....	....	....	....	....	2	....	....	..	..	....	....	....	....	....	....
Urethral Fever	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Rupture of Bladder	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Stricture of Urethra	2	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Enlargement of Prostate Gland	1	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Prostatitis	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Laceration of Urethra	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Total Dis. of Urinary System	250	160	360	288	29	26	7	7	7	4	8	5	11	6	8	7	41	29	14	6	9	5	15	11	29	38	36	41
ORDER 6. (*Generative.*)																												
Ovarian Tumor	....	3	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	1	....	1	....	....
" Dropsy	....	2	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	2	....	....	....	1
Ovariotomy	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Metritis (not Puerperal)	....	5	....	22	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	3	....	4
Metro-Peritonitis (not Puerperal)	....	4	....	20	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	1	....	6	....	5
Fibroid Tumor of Uterus	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	1	....	....
Uterine Tumor	....	4	....	3	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Gangrene of Penis	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	..	..	....	....	....	....	....	....
Orchitis	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Total Dis. of Generative System	2	19	....	55	....	1	1	....	....	....	....	....	....	....	....	....	1	....	....	....	..	..	....	4	....	11	....	10

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PROPORTION OF EACH CAUSE ON TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F			
Class III.—*Continued.*																																	
ORDER 5. (*Urinary.*)																																	
Nephritis	1	8	4	4	4	2	2	4		6	2	8	1	2	1	6	1	1	1	2											67	36	103	.37
Nephria (Bright's Disease)	20	31	42	42	45	33	52	31	51	35	26	34	39	26	25	16	20	11	10	11	5	6	1	3	3	1		1	452	255	707	2.59
Congestion of Kidney															1														1		1		.003
Uræmia	2	2	3	5	4	6	1	2	4	2	1		1	1	3	1				1									27	35	62	.23
Diabetes			1		3		2	1	2	1		2	2	1	1				1		1	1							14	10	24	.06
Addison's Disease								1																						1	1	.03
Calculus					1																								1		1	.03
" of Bladder														1															1		1	.03
" (Lithotomy)													1																1		1	.03
Cystitis	1	1	2		1		2		3		2		5	1	6	1	3	2	3	1									27	8	35	.13
Gangrene of Perinæum					1																								1		1	.03
Abscess "											1				1														2		2	.07
Retention of Urine																													1		1	.03
Suppression of Urine		1								2																			2	3	5	.01
Urethral Fever				1		1						1																	2		2	.07
Rupture of Bladder												1		1															3		3	.01
Stricture of Urethra				1												1					1								3		3	.01
Enlargement of Prostate Gland														1				1											1		1	.03
Prostatitis																1													1		1	.03
Laceration of Urethra										1																			1		1	.03
Total Dis. of Urinary System	24	38	53	53	58	41	61	57	47	38	40	36	53	29	43	25	24	14	15	14	8	8	2	3	3	1		1	550	448	1038	3.81
ORDER 6. (*Generative.*)																																	
Ovarian Tumor			2			1					2			1															7	7		.02
" Dropsy																													6	6		.02
Ovariotomy												1				1													1	1		.003
Metritis (not Puerperal)		8	5		3			2		1		1																	27		27	.09
Metro-Peritonitis (not Puerperal)		4	8		5																								24		24	.08
Fibroid Tumor of Uterus		1						2		1							1												2		2	.07
Uterine Tumor		1	1		1									1															7		7	.03
Gangrene of Penis																	1												1		1	.03
Orchitis																													1		1	.03
Total Dis. of Generative System		14		11		9		4		2		2		3		1	1	2	1										2	74	76	.27

Deaths in New York—(Continued).

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class III.—*Continued.*																												
ORDER 4. (*Digestive.*)																												
Stomatitis	6	6	....	....	....	....	5	4	1	2	....	....	....	....	....	....	6	6	....	....	..	..	....	....	....	....	....	....
Pharyngitis	1	1	1	....	....	....	1	1	....	....	....	....	....	....	1	....	2	1	....	....	..	..	....	....	....	....	....	....
Œsophagitis	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	..	..	....	....	....	....	....	....
Stricture of Œsophagus	....	....	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Gangrene of Throat	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	..	..	....	....	....	....	....	....
Gastritis	44	42	37	51	1	4	22	16	6	4	4	4	1	1	1	1	34	26	3	5	1	2	....	3	5	2	....	5
Enteritis	153	100	24	26	4	2	113	66	13	16	7	2	1	2	1	1	135	87	6	4	3	3	....	2	3	1	....	2
Gastro-enteritis	104	93	7	11	....	2	92	78	5	4	....	1	3	....	....	....	100	83	....	....	..	1	....	....	....	1	....	4
Ulcer of the Stomach	5	1	7	12	2	....	2	....	....	....	....	....	....	....	....	....	2	....	....	....	..	..	....	....	....	....	1	1
Hæmatemesis	5	5	8	2	1	....	....	2	....	....	....	....	....	1	....	....	....	3	....	....	..	..	....	....	2	....	....	....
Hemorrhage of Bowels	4	1	1	....	....	....	2	1	....	....	....	....	....	....	....	....	2	1	....	....	..	..	....	....	....	....	....	....
Peritonitis	52	58	37	78	2	6	8	5	1	1	....	2	1	1	2	....	12	9	6	2	7	3	7	7	12	28	6	15
Ulceration of Intestines	3	3	1	2	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	1	..	....	....	1	....	....	1
Intussusception "	8	3	6	1	1	....	5	1	1	....	....	....	....	....	....	....	6	1	....	....	..	..	....	....	1	....	....	....
Gangrene "	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Stricture "	1	....	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
" Ductus Com. Choledocus	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Hernia (Strangulated)	5	3	15	15	....	....	5	....	....	....	....	....	....	....	....	....	5	....	....	....	..	..	....	....	2	....	....	....
Colic (Lead)	1	1	2	2	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	..	..	....	....	....	....	1	....
Perforation of Vermiform Appendix	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	1	....
Ascites	2	5	5	11	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	..	..	....	1	....	2	....	....
Hypertrophy of Liver	3	1	4	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	1	....	....	....	....	....
Fatty degeneration of Liver	3	5	12	7	2	1	....	1	1	....	....	....	....	....	....	....	1	1	....	....	.	..	....	....	2	....	1	....
Cirrhosis "	16	10	53	41	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	3	3	1	1
Hepatitis	11	15	39	46	....	....	2	....	5	....	1	....	1	....	....	1	9	1	....	....	..	..	....	1	1	1	3	3
Abscess of Liver	1	....	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	1	....	....	....	1	....
Jaundice	14	22	4	5	....	1	14	18	....	....	....	1	....	....	....	....	14	19	....	....	..	..	....	1	....	1	....	....
Disease of Liver	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Splenitis	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	1	....	....	....
Rupture of Spleen	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Leucocythemia	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Sub-peritoneal Tumor	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Stricture of Rectum	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Fistula in Ano	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	..	..	....	....	....	....	....	....
Hæmorrhoids	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Prolapsus Ani	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....
Total Dis. of Digestive System	446	378	275	318	13	18	271	196	53	27	12	10	7	5	5	3	328	241	18	11	12	9	9	15	23	39	15	32

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F						
Class III.—*Continued.*																												
ORDER 7. (*Locomotory.*)																												
Arthritis	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	3	.01	
Osteo-myelitis	....	1	....	2	1	....	....	....	3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	20	.07	
Spinal Disease	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	10	18	.06	
Hip-joint Disease	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	19	.07	
Caries of Spine	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	16	.05	
" Pelvic Bones	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	.07	
Exsection of Hip	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	.03	
Abscess of Elbow and Wrist	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	.03	
Synovitis of Knee	....	....	....	....	1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1	3	.01	
Necrosis	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	3	.01	
Necrosis of Tarsus	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	.03	
Gangrene of Foot	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	....	....	1	2	.07	
" Leg	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	2	.07	
Total Locomotory Diseases	1	2	1	2	4	....	....	....	3	1	....	....	2	..	1	1	..	1	1	..	..	..	..	..	53	88	91	.33
ORDER 8. (*Integumentary.*)																												
Abscess (parts various)	....	2	1	....	....	1	....	1	1	1	....	1	2	..	1	..	..	..	..	..	..	..	..	..	13	16	29	.10
" of Body—Leg*	....	....	....	....	....	....	....	*1	....	....	....	....	....	..	....	..	..	..	..	..	..	..	..	..	....	2	2	.07
Otitis	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	..	..	..	..	..	..	..	..	..	1	....	1	.03
Ulcer (not located)	....	....	....	....	....	....	....	....	1	....	....	....	....	..	....	..	..	..	..	..	..	..	..	..	1	....	1	.03
" of Leg	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	..	1	..	..	..	..	..	..	..	....	1	1	.03
Boils	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	..	..	..	..	..	..	..	..	..	....	1	1	.03
Bupia	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	..	..	..	..	..	..	..	..	..	....	1	1	.03
Phagedenic Ulcer of Thigh	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	..	..	..	..	..	..	..	..	..	....	1	1	.03
Pemphigus	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	..	..	..	..	..	..	..	..	..	....	1	1	.03
Gangrene	....	....	....	....	....	....	2	1	....	....	....	....	1	..	....	..	..	..	..	..	..	..	..	..	2	3	5	.01
Tumor	....	....	....	....	....	....	1	....	....	....	....	....	....	..	....	..	1	..	..	..	..	..	..	..	1	3	4	.01
(Abdominal)	....	....	....	....	....	....	....	1	....	....	....	....	....	..	....	..	..	..	..	..	..	..	..	..	....	1	1	.03
Total Integumentary Diseases	....	2	1	....	....	1	3	4	2	1	....	1	2	1	1	..	..	2	..	..	..	..	..	..	18	30	48	.17

Deaths in New York—(Continued).

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class III.—*Continued.*																												
ORDER 7. (*Locomotory.*)																												
Arthritis	1		1	1															1						1			
Osteo-myelitis	4	6	5	5			2		1			1		1			3	2		3		1			1		1	1
Spinal Disease	4	7	4	3				1					1		2		3	1	1	2	1	3	1	1		1	1	2
Hip-joint Disease	10	7	2			1						1			1		1	1	3	3	3	2	2				1	1
Caries of Spine	7	2	4	3			1						1				2		3	1	2	1	1	1		1	3	
" Pelvic Bones	1		1																						2			
Exsection of Hip	1																										1	
Abscess of Elbow and Wrist		1						1										1										
Synovitis of Knee	1	1	1																					1				
Necrosis	1	1	1					1										1	1									
Necrosis of Tarsus			1																									
Gangrene of Foot			1	1																								
" Leg	2																								1			
Total Locomotory Diseases	32	25	21	13		1	3	3	1			2	2	1	3		9	6	9	9	6	7	4	3	5	2	7	4
ORDER 8. (*Integumentary.*)																												
Abscess (parts various)	7	10	6	6			3	4		3					1		4	7	1			1		1	2	1	1	
" of Body		2						1										1										
Otitis	1																								1			
Ulcer (not located)			1																									
" of Leg				1																								
Boils		1						1										1										
Rupia		1						1										1										
Phagedenic Ulcer of Thigh				1																								1
Pemphigus		1						1										1										
Gangrene			2	3																						1		
Tumor		2	1	1						1								1		1								
" (Abdominal)				1																								
Total Integumentary Diseases	8	16	9	13			3	8		4					1		4	12	1	1		1		1	3	2	1	1

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		Total by Sexes.		Total both Sexes.	Percentage of each Cause on Total.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Class III.—*Continued.*																																
ORDER 7. (*Locomotory.*)																																
Arthritis															1														1		3	.01
Osteo-myelitis		1		2	1				2	1																			9	11	20	.07
Spinal Disease					1														1										8	10	18	.06
Hip-joint Disease	1																												12	7	19	.07
Caries of Spine		1																											11	5	16	.05
" Pelvic Bones																													2		2	.07
Exsection of Hip																													1		1	.03
Abscess of Elbow and Wrist																														1	1	.03
Synovitis of Knee					1						1																		2	1	3	.01
Necrosis			1																										2	1	3	.01
Necrosis of Tarsus					1																								1		1	.03
Gangrene of Foot														1			1												1	1	2	.07
" Leg												1																	2		2	.07
Total Locomotory Diseases	1		1	2	2				3	1		2		1	1		1	1										53	38	91		33
ORDER 8. (*Integumentary.*)																																
Abscess (parts various)		2	1			1		1	1		1	2		1														13	16	29		.10
" of Body—Leg*								*1																						2	2	.07
Otitis																													1		1	.03
Ulcer (not located)									1																				1		1	.03
" of Leg																	1													1	1	.03
Boils																														1	1	.03
Rupia																														1	1	.03
Phagedenic Ulcer of Thigh																														1	1	.03
Pemphigus																														1	1	.03
Gangrene							2						1																2	3	5	.01
Tumor							1										1												1	3	4	.01
" (Abdominal)								1																						1	1	.03
Total Integumentary Diseases		2	1			1	3	2	2		1	2	1	1			2												18	30	48		.17

Deaths in New York—(Continued).

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class III.—*Continued.*																												
ORDER 9. (*Disease of Eye.*)																												
Ophthalmia	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	..	..	....	....	....	....	....	....
Total Diseases of the Eye	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	..	..	....	....	....	....	....	....
Total Local Class	**3332**	**2760**	**2002**	**1715**	**98**	**113**	**1611**	**1329**	**457**	**385**	**181**	**166**	**95**	**93**	**68**	**55**	**2413**	**1927**	**153**	**117**	**71**	**70**	**81**	**94**	**176**	**155**	**186**	**184**
Class IV.																												
DEVELOPMENTAL DISEASES.																												
ORDER 1. (*Children.*)																												
Premature Birth	264	211	....	....	5	3	264	211	....	....	....	....	....	....	....	....	264	211	....	....	..	..	....	....	....	....	....	....
Preternatural Birth	19	13	....	....	.	1	19	13	....	....	....	....	....	....	....	....	19	13	....	....	..	..	....	....	....	....	....	....
Cyanosis	47	43	....	1	.	....	45	43	1	....	....	....	....	1	....	....	46	44	1	....	..	..	....	....	....	....	....	....
Sclerema	1	2	....	....	....	....	1	2	....	....	....	....	....	....	....	....	1	2	....	....	..	..	....	....	....	....	....	....
Atelectasis Pulmonum	74	45	..	....	2	1	74	45	....	....	....	....	....	....	....	....	74	45	....	....	..	..	....	....	....	....	....	....
Malformation (various)	27	16	....	....	....	1	25	16	1	....	....	....	....	....	1	....	27	16	....	....	..	..	....	....	....	....	....	....
Spina Bifida	5	7	....	....	....	1	5	7	..	....	....	....	....	....	....	....	5	7	....	....	..	..	....	....	....	....	....	....
Hemorrhage from Cord	10	4	..	....	....	....	10	4	....	....	....	....	....	....	....	....	10	4	....	....	..	..	....	....	....	....	....	....
Imperforate Anus	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	..	..	....	....	....	....	....	....
Total Developmental Diseases of Children	448	341	....	1	7	7	444	341	2	.	.	....	....	1	1	....	447	342	1	....	..	..	....	....	....	....	....	....

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		Total by Sexes.		Total both Sexes.	Percentage of each Cause on Total.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Class III.—*Continued.*																																		
Order 9. (*Disease of Eye.*)																																		
Ophthalmia	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	....	1	.03
Total Diseases of the Eye	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	....	1	.03
Total of Local Class	256	203	294	262	316	216	272	201	257	171	220	156	228	198	205	155	138	161	76	111	53	53	24	34	11	6	3	1	2	.....	5424	4475	9899	36.43
Class IV.																																		
Developmental Diseases.																																		
Order 1. (*Children.*)																																		
Premature Birth	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	264	211	475	1.74
Preternatural Birth	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	19	13	32	.11
Cyanosis	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	47	44	91	.33
Sclerema	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	2	3	.01
Atelectasis Pulmonum	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	74	45	119	.43
Malformation (various)	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	27	16	43	.15
Spina Bifida	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	5	7	12	.04
Hemorrhage from Cord	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	10	4	14	.05
Imperforate Anus	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	....	1	.03
Total Developmental Diseases of Children	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	448	342	790	2.90

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class IV.—*Continued.*																												
ORDER 2. (*Women.*)																												
Chlorosis	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Childbirth	....	5	....	18	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	....	....	3
Flooding	....	11	....	29	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	4	....	....	9
Puerperal Metritis	....	19	....	68	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	....	22	....	....	14
" Convulsions	....	23	....	23	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	20	....	....	7
" Mania	....	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	....	2
Extra-Uterine Pregnancy	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tubal "	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Hemorrhage—Rupture of Fallopian Tube	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Miscarriage	....	3	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	2
Abortion	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2
Menorrhagia	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Phlegmasia Dolens	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Rupture of Uterus	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Vesico-Vaginal Fistula	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total Developmental Diseases of Women	....	70	....	148	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	12	....	55	....	....	41
ORDER 3. (*Age.*)																												
Old Age	22	60	78	158	3	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Senile Gangrene	....	4	3	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total Diseases of Age	22	64	81	163	3	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
ORDER 4. (*Nutrition.*)																												
Atrophy	20	12	1	1	....	....	15	10	5	1	....	1	....	....	....	....	20	12	....	....	....	....	....	....	....	....	....	....
Asthenia (Debility)	117	95	21	26	3	3	105	79	2	5	....	....	....	....	1	....	108	84	....	1	....	....	1	1	1	1	1	1
Total Diseases of Nutrition	137	108	22	28	3	3	120	89	7	6	....	1	....	....	1	...	128	96	....	1	....	....	1	1	1	1	1	1
Total of Developmental Class	607	584	103	339	13	17	564	430	9	6	....	1	....	1	2	....	575	438	1	1	....	....	13	1	56	1	42	

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE ON TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F			
Class IV.—*Continued.*																																	
ORDER 2. (*Women.*)																																	
Chlorosis	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.03
Childbirth	....	7	....	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	228	....	235	.08
Flooding	....	10	....	11	....	4	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	40	....	40	.14
Puerperal Metritis	....	21	....	18	....	4	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	87	....	87	.30
" Convulsions	....	7	....	5	....	3	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	46	....	46	.16
" Mania	....	1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6	....	6	.02
Extra-Uterine Pregnancy	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.03
Tubal "	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.03
Hemorrhage—Rupture of Fallopian Tube	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.03
Miscarriage	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4	....	4	.01
Abortion	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	3	.01
Menorrhagia	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.003
Phlegmasia Dolens	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.003
Rupture of Uterus	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	2	.006
Vesico-Vaginal Fistula	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.003
Total Developmental Diseases of Women	....	48	....	45	....	12	....	4	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	218	....	218	.80
ORDER 3. (*Age.*)																																	
Old Age	....	....	....	....	....	....	....	....	1	....	....	1	3	....	3	10	18	45	27	48	34	54	13	34	9	12	2	7	3	6	100	218	318	1.17
Senile Gangrene	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	1	2	1	2	....	....	2	....	....	....	1	....	....	....	....	3	9	12	.04
Total Diseases of Age	....	....	....	....	....	....	....	....	1	....	....	1	5	5	3	11	19	45	28	50	34	56	13	34	10	12	2	7	3	6	103	227	330	1.21
ORDER 4. (*Nutrition.*)																																	
Atrophy	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	21	13	34	.12
Asthenia (Debility)	....	2	2	2	1	2	2	....	5	2	1	5	5	4	3	3	4	1	5	2	1	2	2	....	2	....	....	....	138	123	261	.96
Total Diseases of Nutrition	....	2	2	2	1	3	2	....	5	2	1	5	5	5	3	4	4	1	5	2	1	2	2	....	2	....	....	....	159	136	295	1.08
Total of Developmental Class	....	50	2	47	1	15	2	4	2	3	1	6	10	8	14	22	49	29	55	26	69	14	36	10	14	2	7	3	6	710	923	1633	6.00

Deaths in New York—(Continued).

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class V																												
VIOLENT DEATHS.																												
ORDER 1. (*Accidents & Negligence.*)																												
Fractures and Contusions	37	5	86	6	2	....	2	1	2	....	1	....	1	...	3	1	9	2	3	1	5	1	11	1	13	1	15	1
Surgical Operations	4	2	1	2	1	....	3	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	1	....	....	....	....	1
Wounds, Incised	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
" Gunshot	6	....	6	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	3	....	3	....	2	1
" Penetrating	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....
" Poisoned, of Finger	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....
Killed by Vehicles, etc., in Streets	41	4	40	4	....	....	1	....	2	....	1	1	3	....	....	1	7	2	11	1	9	1	5	....	6	....	9	1
Falls (Various)	59	24	108	23	1	2	1	....	2	4	4	2	4	4	3	....	14	10	11	5	9	1	7	2	15	2	20	4
Burns and Scalds	40	41	11	23	....	....	7	2	4	10	11	11	10	6	2	4	34	33	1	3	..	2	3	....	1	4	1	7
Poison, by Aqua Ammonia	....	1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	..	....	..	....	....	....	....	....	....	....
" by Morphine	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
" by Tincture of Aconite	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
" by Spirits of Turpentine	1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	....	....	....	..	....	....	....	....	....	....	....	....
" by Opium	2	....	....	....	....	....	1	....	....	....	....	....	....	....	1	....	2	....	....	....	..	....	....	....	....	....	....	....	....
" by Gas	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	..	....	....	....	....	....	....	....
" by Chloroform	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
" by Carbolic Acid	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	..	....	....	....	....	....	....	....
" by Arsenite of Copper	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
" by Overdose of Brandy	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	..	....	....	....	....	....	....	....
" by Vaccine Virus	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	..	....	....	....	....	....	....	....
Suffocation (Asphyxia)	28	18	8	2	....	....	20	18	1	....	1	....	....	....	1	....	23	18	1	....	..	....	....	....	....	....	2	....
Drowning	45	5	118	13	5	....	....	2	1	....	....	....	....	....	1	....	2	2	12	1	10	1	7	1	9	....	17	2
Effects of Immersion	....	....	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
Struck by Lightning	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....
Total Deaths by Accident and Negligence	206	102	389	77	10	2	36	23	13	15	18	14	18	10	11	7	96	69	44	11	35	6	36	5	47	7	73	17
ORDER 2. (*Homicide.*)																												
By Blows	1	....	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....
By Cut, Stab	5	1	12	....	....	....	1	1	....	....	....	....	....	....	....	....	1	1	....	....	1	....	1	....	4	....	1	....
By Gunshot	4	1	4	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	5	....	....	1
By Suffocation	2	2	....	....	....	....	2	2	....	....	....	....	....	....	....	....	2	2	....	....	..	....	....	....	....	....	....	....
By other means	1	....	2	3	....	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	..	....	....	....	1	1	....	....
Total Homicidal Deaths	13	4	24	4	1	....	3	3	....	1	....	....	....	....	....	....	3	4	....	....	2	..	1	....	10	1	2	1

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE ON TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Class V. VIOLENT DEATHS. ORDER 1. (*Accidents & Negligence.*)																																		
Fractures and Contusions	11	1	15	1	16	....	9	1	10	....	2	..	2	..	1	1	..	..	..	..	..	..	1	..	..	..	..	..	....	..	123	11	134	.49
Surgical Operations	1	....	....	....	....	1	....	....	....	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	5	4	9	.03
Wounds, Incised	....	....	....	....	....	....	....	1	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	....	1	1	.003
" Gunshot	1	....	1	1	....	....	1	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	12	2	14	.05
" Penetrating	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	....	1	.003
" Poisoned, of Finger	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	....	1	.003
Killed by Vehicles, etc., in Streets	10	....	4	1	5	1	1	1	2	....	3	..	..	..	4	..	..	..	1	..	1	..	..	..	..	..	..	..	....	..	81	8	89	.33
Falls (Various)	9	2	20	2	15	1	12	1	12	3	5	1	1	4	3	1	5	4	2	2	..	2	1	..	..	..	..	..	....	..	107	47	214	.78
Burns and Scalds	1	2	2	1	....	2	3	2	3	1	1	1	1	4	..	1	..	1	..	..	..	..	..	..	..	..	..	..	....	..	51	64	115	.42
Poison, by Aqua Ammonia	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	....	1	1	.003
" by Morphine	....	....	1	....	....	....	....	....	....	....	....	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	2	....	2	.07
" by Tincture of Aconite	1	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	....	1	.003
" by Spirits of Turpentine	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	....	1	.003
" by Opium	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	2	....	2	.07
" by Gas	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	....	1	.003
" by Chloroform	....	1	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	....	1	1	.003
" by Carbolic Acid	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	....	1	1	.003
" by Arsenite of Copper	....	....	....	....	....	1	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	....	1	1	.003
" by Overdose of Brandy	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	....	1	.003
" by Vaccine Virus	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	....	1	.003
Suffocation (Asphyxia)	2	....	3	....	1	1	1	....	....	....	1	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	36	20	56	.20
Drowning	13	5	31	2	28	2	12	....	10	2	7	..	..	..	2	..	2	..	1	..	..	..	..	..	..	..	..	..	....	..	163	18	181	.66
Effects of Immersion	1	....	2	....	....	....	1	....	1	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	5	....	5	.01
Struck by Lightning	1	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	1	....	1	.003
Total Deaths by Accident and Negligence	51	11	79	8	65	9	40	6	38	7	20	2	5	9	12	3	7	5	4	2	1	2	2	..	..	..	..	..	....	..	655	179	834	3.06
ORDER 2. (*Homicide.*)																																		
By Blows	1	....	....	....	1	....	1	....	1	....	....	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	....	..	7	....	7	.02
By Cut, Stab	4	....	1	....	1	....	1	....	....	....	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	17	1	18	.06
By Gunshot	....	1	1	....	....	....	1	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	8	2	10	.03
By Suffocation	....	....	....	....	....	....	....	....	....	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	2	2	4	.01
By other means	1	....	....	....	....	....	....	1	1	....	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	3	3	6	.02
Total Homicidal Deaths	6	1	2	....	2	....	3	1	2	....	2	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	....	..	37	8	45	.16

Deaths in New York—(Continued).

CAUSES OF DEATH.	NATIVITY.				COLOR'D		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Class V.—*Continued.*																												
ORDER 3. (*Suicide.*)																												
By Poison	6	2	8	9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	2	4	2
By Drowning	....	....	10	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....
By Hanging	1	....	22	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	2	....	....
By Leap from height	....	....	3	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	1
By Gunshot	6	....	15	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	2	....	....
By Cut, Stab, etc	2	....	4	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	1	....
Placing himself before a locomotive	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....
Total Suicidal Deaths	16	2	63	20	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	5	2	12	4	....
(*Execution.*)																												
John Real	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
John Reynolds *alias* Breen	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....
Sudden (causes unascertained)	12	5	1	....	....	....	11	5	....	....	....	....	....	....	....	....	11	5	....	....	....	....	....	....	....	....	....	....
Total from Violent Class.	307	113	479	101	11	2	50	31	13	16	18	14	18	10	11	7	110	78	44	11	37	6	38	5	63	10	87	22
Grand total from all causes	9,237	8,324	5,338	4,476	246	220	4,534	3,849	1,439	1,274	589	562	335	349	232	200	7,119	6,214	462	360	199	165	259	308	580	580	704	641

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 and upw'ds		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE ON TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Class V.—*Continued.*																																
UNDER 3. (*Suicide.*)																																
By Poison	....	2	1	2	1	....	2	1	2	2	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	14	11	25	.09
By Drowning	....	....	1	....	....	....	2	1	2	2	....	2	....	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	10	1	11	.03
By Hanging	....	1	5	....	2	1	2	1	2	....	2	....	2	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	23	4	27	.09
By Leap from height	....	1	1	....	....	1	1	1	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	3	4	7	.02
By Gunshot	....	4	....	2	....	....	4	....	....	1	....	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	21	..	21	.07
By Cut, Stab, etc	....	....	1	....	1	....	2	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	2	9	.03
Placing himself before a locomotive	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	1	.003
Total Suicidal Deaths	5	4	15	2	7	1	11	4	7	2	4	1	7	1	4	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	79	22	101	.37
(*Execution.*)																																
John Real	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.003
John Reynolds *alias* Breen	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	.003
Sudden (causes unascertained)	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	13	5	18	.06
Total from Violent Class.	64	16	96	10	75	10	54	11	47	9	26	3	13	10	16	3	7	6	6	2	2	1	2	1	....	....	....	....	....	....	786	214	1,000	3.68
Grand total from all Causes	709	646	745	684	713	635	634	431	571	403	440	315	424	344	338	284	242	206	156	226	138	100	49	31	24	7	9	6	5	....	14,475	12,700	27,175	

Recapitulation.

CAUSES OF DEATH	NATIVITY. United States M	United States F	Foreign M	Foreign F	Colored M	Colored F	Under One Year M	Under One Year F	1 M	1 F	2 M	2 F	3 M	3 F	4 M	4 F	Total Under 5 Years M	Total Under 5 Years F	5 M	5 F	10 M	10 F	15 M	15 F	20 M	20 F	25 M	25 F
CLASSES.																												
Zymotic	3,264	3,245	997	763	46	36	1,733	1,673	726	663	290	308	179	191	125	113	3,053	2,948	214	187	55	41	49	64	102	85	122	110
Constitutional	1,632	1,522	1,617	1,558	78	62	576	486	224	204	100	73	42	35	26	25	969	823	50	44	36	48	91	132	228	274	308	283
Local	3,322	2,760	2,102	1,715	98	112	1,611	1,229	457	385	181	166	95	92	68	55	2,412	1,927	153	117	71	70	81	94	176	155	186	184
Developmental	607	584	103	239	13	17	564	430	9	6	....	1	...	1	2	...	575	438	1	1	..	..	..	13	1	56	1	42
Violence	207	113	479	101	11	2	50	31	13	16	18	14	18	10	11	7	110	78	44	11	37	6	38	5	63	10	87	22

CAUSES OF DEATH.	30 M	30 F	35 M	35 F	40 M	40 F	45 M	45 F	50 M	50 F	55 M	55 F	60 M	60 F	65 M	65 F	70 M	70 F	75 M	75 F	80 M	80 F	85 M	85 F	90 M	90 F	95 M	95 F	100 and Upw'd M	100 and Upw'd F	Total by Sexes M	Total by Sexes F	Total both Sexes.	Percentage of each Cause on Total.
CLASSES.																																		
Zymotic	99	116	112	101	110	75	88	46	62	54	62	38	59	30	30	38	33	36	24	24	9	11	3	3	..	1	..	..	...	...	4,306	4,008	8,314	30.60
Constitutional	260	261	241	264	211	219	216	169	179	166	151	112	116	96	79	74	52	54	21	34	11	15	6	8	..	3	2	1	...	...	3,249	3,080	6,329	23.29
Local	256	203	204	202	216	216	272	201	257	171	220	156	228	199	205	155	128	161	76	111	52	53	24	34	11	6	3	1	2	...	5,424	4,475	9,899	36.43
Developmental	...	50	2	47	1	15	2	4	6	3	1	6	6	10	8	14	22	49	29	55	26	57	14	36	10	14	2	7	3	6	710	923	1,633	6.00
Violence	64	16	96	10	75	10	54	11	47	9	26	8	13	10	10	3	7	6	6	2	1	2	2	..	..	..	..	..	..	..	786	214	1,000	3.68

Recapitulation—Total Deaths by Classes—Percentages.

CAUSES OF DEATH.	NATIVITY.		Colored.	Under 1 year.	1	2	3	4	Total under 5 years.	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100 and upward.	Total by Sexes.	Percentage of each Class on Total.
	United States.	For'gn.																												
CLASSES.																														
Zymotic..... {M...	3,369	937	46	1,733	726	290	179	125	3,053	214	55	49	102	122	99	112	110	88	82	62	50	30	33	21	9	3	...	....	....	4,306	15.85
{F...	3,245	763	36	1,673	663	308	191	113	2,948	187	41	64	85	110	116	101	75	46	54	38	30	38	36	24	11	3	1	....	....	4,008	14.75
Total of both Sexes.....	6,614	1,700	82	3,406	1,389	598	370	238	6,001	401	96	113	187	232	215	213	185	134	136	100	80	68	69	45	20	6	1	....	....	8,314	30.60
Constitutional..... {M...	1,632	1,617	78	576	224	100	43	26	999	50	36	91	238	308	290	241	211	218	179	131	116	79	52	21	11	6	...	2	....	3,249	11.95
{F...	1,522	1,558	62	486	204	72	35	25	823	44	48	132	274	283	261	264	219	169	166	112	96	74	54	34	15	8	3	1	....	3,080	11.33
Total of both Sexes.....	3,154	3,175	140	1,062	428	172	78	51	1,792	94	84	223	512	591	551	505	430	387	345	243	212	153	106	55	26	14	3	3	....	6,329	23.28
Local..... {M...	3,322	2,102	98	1,611	457	181	95	68	2,412	153	71	81	176	186	256	294	316	272	257	220	228	205	128	76	53	24	11	3	2	5,434	19.96
{F...	2,760	1,715	112	1,229	385	166	92	55	1,927	117	70	94	155	184	203	262	216	201	171	156	198	155	161	111	53	34	6	1	....	4,475	16.47
Total of both Sexes.....	6,082	3,817	210	2,840	842	347	187	123	4,339	270	141	175	331	370	459	556	532	473	428	376	426	360	289	187	106	58	17	4	2	9,909	36.43
Developmental..... {M...	607	103	13	564	9	....	....	2	575	1	....	....	1	1	....	2	1	2	6	1	6	8	22	29	26	14	10	2	3	710	2.61
{F...	584	339	17	439	6	1	1	....	438	1	....	13	56	42	50	47	15	4	3	6	10	14	49	55	57	36	14	7	6	923	3.40
Total of both Sexes.....	1,191	442	30	994	15	1	1	2	1,013	2	....	13	57	43	50	49	16	6	9	7	16	22	71	84	83	50	24	9	9	1,633	6.01
Violence..... {M...	307	479	11	50	13	18	18	11	110	44	37	38	63	87	64	96	75	54	47	26	13	16	7	6	1	2	...	....	....	786	2.89
{F...	113	101	2	31	16	14	10	7	78	11	6	5	10	22	16	10	10	11	9	3	10	3	6	2	2	...	....	....	....	214	.79
Total of both Sexes.....	420	580	13	81	29	32	28	18	188	55	43	43	73	109	80	106	85	65	56	29	23	19	13	8	3	2	....	....	....	1,000	3.68
Total (by Sexes)..... {M...	9,237	5,238	246	4,534	1,429	589	335	232	7,119	462	199	259	580	704	709	745	713	654	571	440	422	338	242	156	100	49	21	7	5	14,475	53.26
{F...	8,224	4,476	229	3,849	1,274	562	329	209	6,214	360	165	308	580	641	646	684	535	431	403	315	344	284	306	226	138	81	24	9	6	12,700	46.74
Total of both Sexes.....	17,461	9,714	475	8,383	2,703	1151	664	432	13,333	822	364	567	1160	1345	1355	1429	1248	1085	974	755	766	622	548	382	238	130	45	16	11	27,175	100.00
Percentage on total mortality of each Sex in each period of life.... {M.	33.99	19.27	.91	16.69	5.26	2.17	1.23	.85	26.20	1.70	.73	.96	2.13	2.59	2.61	2.74	2.62	2.33	2.10	1.62	1.55	1.24	.89	.57	.37	.18	.08	.03	.02	53.26	
{F.	30.27	16.47	.84	14.15	4.60	2.07	1.21	.74	22.86	1.32	.61	1.12	2.13	2.36	2.38	2.52	1.97	1.59	1.48	1.16	1.27	1.05	1.13	.83	.51	.30	.09	.03	.02	46.74	
Percentage on total mortality of both Sexes in each period of life.....	64.26	35.74	1.75	30.84	9.95	4.24	2.44	1.59	49.06	3.02	1.34	2.09	4.26	4.95	4.99	5.26	4.59	3.92	3.58	2.78	2.82	2.29	2.02	1.40	.88	.48	.17	.06	.04	100.00	

Recapitulation.

CAUSES OF DEATH.	NATIVITY.				COLORED.		UNDER ONE YEAR.		1		2		3		4		TOTAL UNDER 5 YEARS.		5		10		15		20		25	
	UNITED STATES.		FOREIGN.																									
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
CLASSES.																												
Zymotic	3,369	3,245	937	763	46	36	1,733	1,673	726	663	290	308	179	191	125	113	3,053	2,948	214	187	55	41	49	64	102	85	122	110
Constitutional	1,639	1,522	1,617	1,558	78	62	576	486	224	204	100	73	43	35	26	25	969	823	50	44	36	48	91	132	228	274	308	283
Local	3,322	2,760	2,102	1,715	98	112	1,611	1,229	457	385	181	166	95	92	68	55	2,412	1,927	153	117	71	70	81	94	176	155	186	184
Developmental	607	584	103	339	13	17	564	430	9	6	....	1	...	1	2	...	575	438	1	1	..	..	..	13	1	56	1	42
Violence	307	113	479	101	11	2	50	31	13	16	18	14	18	10	11	7	110	78	44	11	37	6	38	5	63	10	87	22

CAUSES OF DEATH.	30		35		40		45		50		55		60		65		70		75		80		85		90		95		100 AND UPW'D		TOTAL BY SEXES.		TOTAL BOTH SEXES.	PERCENTAGE OF EACH CAUSE ON TOTAL.
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
CLASSES.																																		
Zymotic	99	116	112	101	110	75	88	46	82	54	62	38	59	30	30	38	33	36	24	24	9	11	3	3	..	1	..	..	...	...	4,306	4,008	8,314	30.60
Constitutional	290	261	241	264	211	219	218	169	179	166	131	112	116	96	79	74	52	54	21	34	11	15	6	8	..	3	2	1	...	...	3,249	3,080	6,329	23.29
Local	256	203	294	262	316	216	272	201	257	171	220	156	228	198	205	155	128	161	76	111	53	53	24	34	11	6	3	1	2	...	5,424	4,475	9,899	36.43
Developmental	...	50	2	47	1	15	2	4	6	3	1	6	6	10	8	14	22	49	29	55	26	57	14	36	10	14	2	7	3	6	710	923	1,633	6.00
Violence	64	16	96	10	75	10	54	11	47	9	26	3	13	10	16	3	7	6	6	2	1	2	2	..	..	..	..	..	...	...	786	214	1,000	3.68

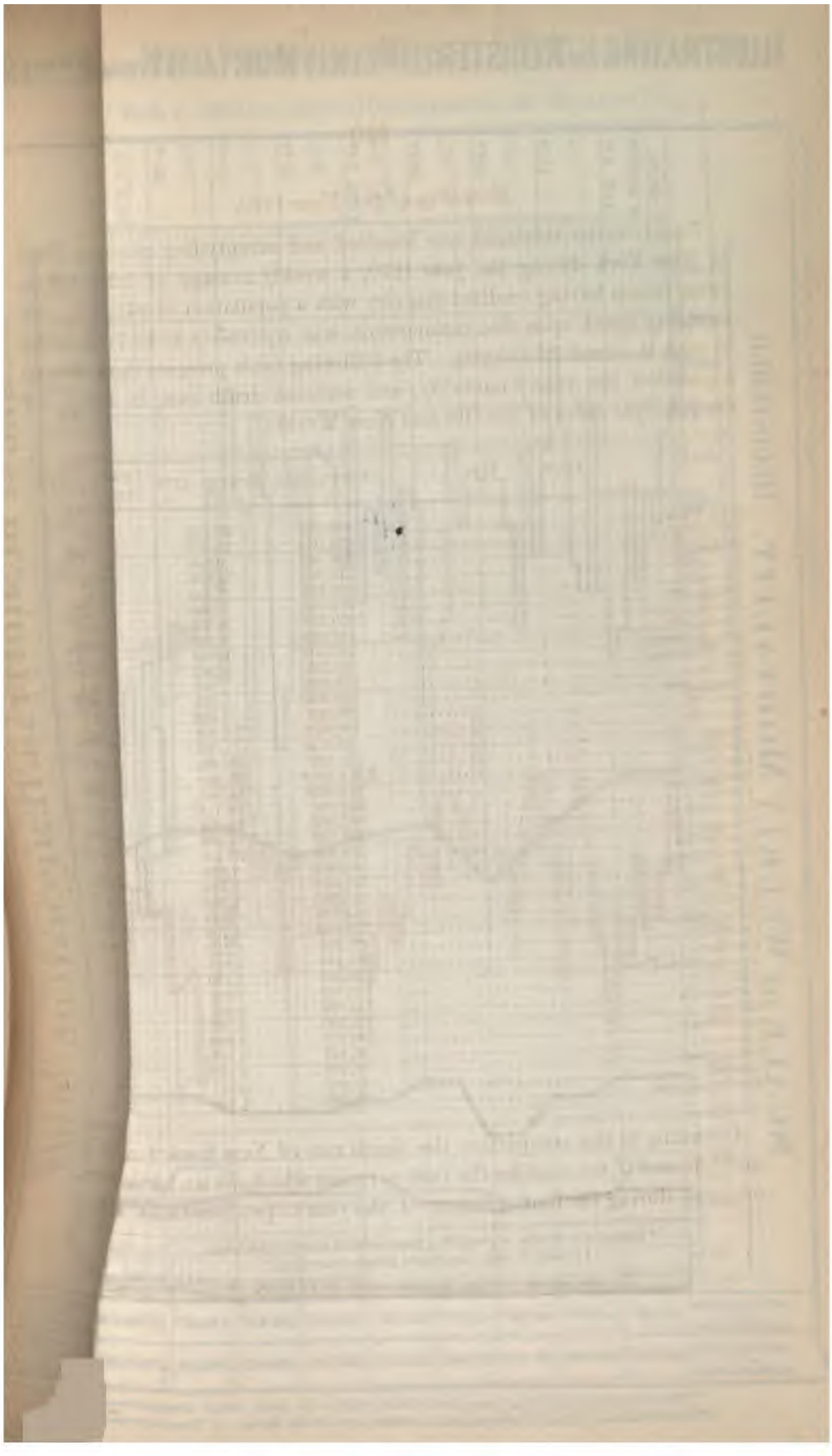
Mortality of the Year 1870.

Twenty-seven thousand one hundred and seventy-five persons died in New York during the year 1870, a weekly average of 522. The latest census having credited this city with a population of 942,252, the mortality based upon that enumeration was equivalent to 28.79 deaths in each thousand inhabitants. The following table presents the present population, last yearly mortality, and assumed death rate, in some of the principal cities of the Old and New World:

City.	Population.	Deaths—1870.	Death rate per 1,000.
New York	942,252	27,175	28.8
Philadelphia	674,022	15,317	22.72
Brooklyn	396,105	9,546	24.
St. Louis	312,963	6,670	21.3
Chicago	299,319	7,342	24.5
Baltimore	283,070	7,262	25.65
Boston	250,526	6,098	24.33
Cincinnati	216,239	3,978	18.39
New Orleans	191,512	6,942	36.24
San Francisco	150,351	3,243	21.57
Buffalo	118,050	1,705	14.44
Washington	109,204	1,835	16.80
Newark	105,000	2,469	23.51
Louisville	100,662	2,309	22.93
Detroit	79,619	1,993	25.
Montreal	127,826	3,994	31.3
London	3,214,707*	77,278	24.0
Bombay	816,562†	14,888	18.2
Vienna	622,087	18,518	29.8
Liverpool	517,567	16,094	31.1
Glasgow	468,189	13,929	29.8
Manchester	374,993	10,428	27.8
Birmingham	369,604	7,805	21.1
Dublin	321,540	7,728	24.0
Leeds	259,527	7,320	28.2
Sheffield	247,378	6,245	25.2
Edinburgh	178,970	4,706	26.3
Bristol	171,382	5,123	29.9
Bradford	143,197	3,914	27.3
Newcastle-on-Tyne	133,367	3,210	24.1
Hull	130,869	2,851	21.8
Portsmouth	122,084	2,461	20.2
Salford	121,580	3,167	26.0
Sunderland	100,979	2,026	20.1
Leicester	97,427	2,591	26.6
Nottingham	88,888	2,137	24.0
Norwich	81,087	2,217	27.3
Wolverhampton	72,990	1,589	21.8

According to this comparison the death rate of New York for 1870 was high, and if we consider the various causes which, as we have seen, combined during the four quarters of the year to produce such result—

* Estimated to middle of year 1870. Same with the other British towns.
† Census of 1864. Death rate therefore unreliable.



it will not excite our surprise. That the mortality was, for the city itself, exceptionally great, may be perceived by comparing it with that of other years, it having been in excess somewhat (by 360) even over that of 1866, when cholera carried off 1,192 persons. Its excess over that of 1867 amounted to 4,016, of 1868 to 2,286, and of 1869 to 2,008.

But in drawing comparisons between the death-rates of New York and other cities there is one very important circumstance which must constantly be held in view. Without disparagement to the system of registration in other places, it can confidently be affirmed that the mortuary records of this Department are more full and accurate than those of any other city in the world. It is estimated that in England and Wales, notwithstanding the universal compulsory system of registration, more than 50,000 interments annually escape the attention of the authorities and consequently have no authentic record. The more extensive a city is, the more abundant are the facilities for the illegal removal and burial of dead bodies afforded to the ignorant, the negligent, and the criminal. Now, the same surroundings which conduce so greatly to the salubrity of our city are likewise the barriers which enable her authorities to repress any clandestine or unauthorized removal of her dead. Isolated by water upon every side, with strict surveillance over all avenues of egress, and over the cemeteries within her jurisdiction, we may justly claim for New York the most complete and reliable statistical memorials of mortality. Were other cities as favorably situated, it is certain that their statistics would present a very different aspect from what they do at present. As an example, we find the city of Buffalo, with a population of 118,050, showing an annual mortality of only 1,705, or 14.44 in the thousand. These figures would distinguish Buffalo as the favorite abode of Hygiea were it not for their acknowledged inaccuracy. Dr. B. H. Daggett, the accomplished Health Physician of that city, makes the following candid admission: "My mortuary reports are imperfect, owing to the carelessness of physicians and undertakers in making out death-certificates and sending them to the office." It need scarcely be remarked that no person dying in New York can be legally interred without a permit from this Department, and that such permit cannot possibly be procured until a full and satisfactory certificate of death from the medical attendant or coroner has been deposited in this Bureau.

Condensed Summary of the Mortality Records in the Five Successive Years, 1866, Percentages

CAUSES OF DEATH.		NATIVITY.		Under 1 year.	1	2	3	4	Total under 5 years.	5	10	15
		U. S.	Foreign.									
CLASSES.	YEARS.											
Zymotic	1866	.....	.....	2,600	1,280	524	341	257	5,002	501	162	216
	1867	.....	.....	2,556	1,281	505	294	181	4,917	306	71	85
	1868	.....	.....	3,394	1,336	478	310	188	5,706	396	72	103
	1869	.....	.....	2,943	1,400	632	424	301	5,700	419	92	108
	1870	.....	.....	2,406	1,389	598	370	238	6,001	401	96	113
Constitutional	1866	.....	.....	1,352	518	184	82	45	2,181	181	83	219
	1867	.....	.....	1,042	483	165	75	50	1,815	108	71	188
	1868	.....	.....	997	513	142	66	39	1,757	109	60	188
	1869	.....	.....	993	474	190	65	45	1,767	116	57	177
	1870	.....	.....	1,002	428	173	78	51	1,792	94	84	223
Local	1866	.....	.....	2,729	832	340	179	129	4,209	303	131	181
	1867	.....	.....	2,651	953	361	199	128	4,292	284	157	146
	1868	.....	.....	2,764	986	396	199	126	4,471	299	156	173
	1869	.....	.....	2,530	995	442	218	157	4,342	343	158	166
	1870	.....	.....	2,840	842	347	187	123	4,339	270	141	175
Developmental	1866	.....	.....	989	72	14	6	3	1,084	10	6	19
	1867	.....	.....	1,016	60	5	2	4	1,087	3	5	14
	1868	.....	.....	902	33	9	4	3	951	6	2	15
	1869	.....	.....	871	11	2	2	1	887	2	....	20
	1870	.....	.....	994	15	1	1	2	1,013	2	....	13
Violence	1866	.....	.....	99	20	20	15	9	173	78	36	38
	1867	.....	.....	99	17	20	17	10	163	52	42	36
	1868	.....	.....	100	20	25	21	16	182	46	43	42
	1869	.....	.....	68	26	29	24	16	163	60	47	37
	1870	.....	.....	81	29	32	28	18	188	55	43	43
Total	1866	16,621	10,184	7,769	2,722	1,092	623	443	12,649	1,023	418	673
	1867	15,479	7,680	7,464	2,794	1,056	587	373	12,274	753	346	469
	1868	16,805	8,084	8,157	2,888	1,050	600	372	13,067	856	333	523
	1869	16,557	8,610	7,405	2,906	1,295	733	520	12,859	941	354	498
	1870	17,461	9,714	8,383	2,703	1,151	664	432	13,333	822	364	567
Percentage on total mortality given by the deaths of both sexes in each period of life	1866	62.02	37.98	28.97	10.15	4.07	2.32	1.65	47.17	3.82	1.50	2.51
	1867	66.84	33.16	32.23	12.06	4.56	2.03	1.61	52.99	3.25	1.49	2.03
	1868	67.52	32.48	32.77	11.60	4.22	2.41	1.49	52.50	3.44	1.34	2.10
	1869	65.79	34.21	29.42	11.55	5.14	2.91	2.07	51.09	3.74	1.40	1.98
	1870	64.26	35.74	30.84	9.95	4.24	2.44	1.59	49.06	3.02	1.34	2.09

1867, 1868, 1869, and 1870, by Classes of Causes, at the Different Ages, with of the Same.

20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100 and upwards.	Total both Sexes.	Percentage of each class on total.
405	438	383	352	298	241	224	193	162	133	61	47	31	6	1	2	1	8,859	33.04
152	163	170	159	100	104	80	70	69	52	40	22	10	10	3	...	...	6,583	28.41
146	178	154	137	80	115	90	48	76	69	35	28	14	6	2	1	...	7,456	29.96
178	177	173	163	150	101	112	82	75	60	31	30	13	5	4	2	1	7,676	30.50
187	232	215	213	185	134	136	100	89	68	69	48	20	6	1	...	...	8,314	30.60
486	479	458	450	359	309	252	204	170	152	87	54	26	8	1	1	...	6,104	22.76
444	489	412	470	367	311	237	166	157	141	69	49	21	7	....	...	...	5,513	23.80
483	521	468	444	355	329	229	211	181	151	92	53	21	8	4	...	...	5,664	22.76
450	503	450	468	405	324	261	196	189	160	104	61	19	10	2	1	...	5,720	22.73
512	591	551	505	430	387	345	243	212	153	106	55	26	14	3	3	...	6,329	23.28
345	396	501	463	408	353	397	319	298	306	211	115	66	24	6	4	...	9,036	33.70
302	346	368	400	348	370	321	272	300	245	194	115	54	27	5	1	...	8,547	36.91
330	412	434	482	437	421	348	289	299	319	239	158	52	36	5	...	...	9,362	37.61
281	363	412	450	418	495	398	309	359	333	250	165	91	46	7	2	1	9,389	37.31
331	370	459	556	532	473	428	376	426	360	289	187	106	58	17	4	2	9,899	36.43
29	23	41	30	21	24	19	14	50	56	102	111	123	68	24	16	7	1,877	7.00
35	30	37	37	21	18	8	19	31	36	65	70	108	53	27	11	5	1,720	7.43
31	38	32	37	15	10	5	8	10	25	57	98	93	45	32	8	5	1,523	6.12
34	40	41	33	14	7	6	4	12	27	42	77	88	54	29	11	6	1,435	5.70
57	43	50	49	16	6	9	7	16	22	71	84	83	50	24	9	9	1,633	6.01
63	85	107	95	83	45	40	25	37	19	8	5	2	2	....	...	...	959	3.50
70	61	61	114	63	44	30	16	10	19	7	4	3	1	....	...	...	796	3.44
53	79	98	101	75	59	28	23	26	9	12	6	....	2	....	...	...	884	3.55
61	97	88	85	97	81	59	20	23	14	8	7	5	2	2	1	...	947	3.77
73	109	80	106	85	65	56	29	23	19	13	8	3	2	....	...	...	1,000	3.68
1,328	1,419	1,490	1,390	1,169	966	932	755	717	666	469	332	248	108	32	23	8	26,815	.....
1,003	1,080	1,048	1,180	899	847	676	543	567	493	375	260	196	98	35	12	5	23,159	.....
1,043	1,228	1,186	1,301	962	934	700	579	592	573	435	343	180	97	43	9	5	24,889	.....
1,004	1,180	1,164	1,199	1,084	1,008	836	611	658	594	435	340	216	117	44	17	8	25,167	.....
1,160	1,345	1,355	1,429	1,248	1,065	974	755	766	622	548	382	238	130	45	16	11	27,175	.....
4.95	2.29	5.56	5.11	4.36	3.60	3.48	2.82	2.67	2.48	1.75	1.24	.92	.40	.12	.08	.03	.....	.....
4.33	4.66	4.53	5.10	3.88	3.66	2.91	2.34	2.45	2.13	1.62	1.12	.85	.42	.15	.05	.02	.....	.....
4.19	4.93	4.77	4.83	3.87	3.75	2.81	2.32	2.34	2.30	1.75	1.38	.72	.39	.17	.04	.02	.....	.....
3.99	4.69	4.62	4.76	4.31	4.00	3.32	2.43	2.61	2.36	1.73	1.35	.86	.46	.17	.07	.03	.....	.....
4.26	4.95	4.99	5.26	4.59	3.92	3.58	2.78	2.82	2.29	2.02	1.40	.88	.48	.17	.06	.04	.....	.....

Condensed Summary of the Mortality Records in the Five Successive Years, 1866, Percentages

CAUSES OF DEATH.		NATIVITY.		Under 1 year.	1	2	3	4	Total under 5 years.	5	10	15
		U. S.	Foreign.									
CLASSES.	YEARS.											
Zymotic	1866	.....	.....	2,600	1,280	524	341	257	5,002	501	162	216
	1867	.....	.....	2,556	1,281	505	294	181	4,917	306	71	85
	1868	.....	.....	3,394	1,336	478	310	188	5,706	396	72	103
	1869	.....	.....	2,943	1,400	632	424	301	5,700	419	92	108
	1870	.....	.....	3,406	1,389	598	370	238	6,001	401	96	113
Constitutional	1866	.....	.....	1,352	518	184	82	45	2,181	181	83	219
	1867	.....	.....	1,042	483	165	75	50	1,815	108	71	188
	1868	.....	.....	997	513	142	66	39	1,757	109	60	188
	1869	.....	.....	993	474	190	65	45	1,767	116	57	177
	1870	.....	.....	1,062	428	173	78	51	1,792	94	84	223
Local	1866	.....	.....	2,729	892	340	179	129	4,209	303	131	181
	1867	.....	.....	2,651	953	361	199	128	4,292	284	157	146
	1868	.....	.....	2,764	986	396	199	126	4,471	299	156	175
	1869	.....	.....	2,530	995	442	218	157	4,342	343	158	166
	1870	.....	.....	2,840	842	347	187	123	4,339	270	141	175
Developmental	1866	.....	.....	989	72	14	6	3	1,084	10	6	19
	1867	.....	.....	1,016	60	5	2	4	1,087	3	5	14
	1868	.....	.....	902	33	9	4	3	951	6	2	15
	1869	.....	.....	871	11	2	2	1	887	3	....	20
	1870	.....	.....	994	15	1	1	2	1,013	2	....	13
Violence	1866	.....	.....	99	20	30	15	9	173	78	36	33
	1867	.....	.....	99	17	20	17	10	163	52	42	36
	1868	.....	.....	100	20	25	21	16	182	46	43	42
	1869	.....	.....	68	26	29	24	16	163	60	47	27
	1870	.....	.....	81	29	32	28	18	188	55	43	43
Total	1866	16,631	10,184	7,769	2,722	1,092	623	443	12,649	1,093	418	673
	1867	15,479	7,680	7,464	2,794	1,056	587	373	12,274	753	346	469
	1868	16,805	8,084	8,157	2,888	1,050	600	372	13,067	856	333	523
	1869	16,557	8,610	7,405	2,906	1,295	733	520	12,859	941	354	498
	1870	17,461	9,714	8,383	2,703	1,151	664	432	13,333	822	364	567
Percentage on total mortality given by the deaths of both sexes in each period of life	1866	62.02	37.98	28.97	10.15	4.07	2.32	1.65	47.17	3.82	1.50	2.51
	1867	66.84	33.16	32.23	12.06	4.56	2.03	1.61	52.99	3.25	1.49	2.03
	1868	67.52	32.48	32.77	11.60	4.22	2.41	1.49	52.50	3.44	1.34	2.10
	1869	65.79	34.21	29.42	11.55	5.14	2.91	2.07	51.09	3.74	1.40	1.98
	1870	64.26	35.74	30.84	9.95	4.24	2.44	1.59	49.06	3.02	1.34	2.09

Observations upon the Principal Causes of Death during the Year.

As the perfect and systematic registration of deaths in New York, and the classification of causes according to the admirable system of Dr. Farr, has afforded within five years such ample material for comparison and analysis, the accompanying tables are presented in order to furnish a synopsis of mortality from the chief classes, orders, and more important varieties of affections within that period of time. As each quarter, in itself, of 1870, has been reviewed and its salient features indicated, it remains for us to offer a few considerations upon the course of those diseases which principally contributed to the mortality of the year.

ZYMOTIC DISEASES.

This most important and fluctuating group of diseases destroyed 8,314 lives during the year, being over 30 per cent. of the total mortality, or about the same relative proportion as in 1869. These deaths were marked by the usual excess of males over females, there being 4,306 of the former and 4,008 of the latter. About 80 per cent. were in persons of native birth, which fact is accounted for by the correlative one that almost the same proportion occurred in children of five years old or less. 3,406, or about 40 per cent., were in infants under one year old; and 4,795, or about 50 per cent., in those under two, being two per cent. more mortality among infants than in 1869, but five per cent. less than in 1868. The most prominent of these affections were as follows:

Small-pox.

There were 293 deaths from small-pox, a greater number than in any previous year since 1865. 167 were males and 126 females, and about half in children of five years old or less. There occurred 189 in persons under twenty years of age, 75 in those between twenty and forty years, 27 between forty and sixty years, and 2 after sixty—corresponding quite closely with the proportions in 1869. The disparity between the sexes was confined principally to persons of twenty years old and upwards, among whom the males preponderated about 100 per cent. A similar difference was noticeable in 1869. It arises doubtless from the different circumstances under which the two sexes are placed

DEATHS FROM ZYMOTIC DISEASES.

NEW YORK.—DEATHS FROM SMALL-POX, MEASLES, SCARLATINA, DIPHTHERIA, WHOOPING-COUGH, TYPHOID FEVER, TYPHUS FEVER, CHOLERA, CHOLERA INFANTUM, DIARRHŒAL MALADIES, YELLOW FEVER, AND OTHER ZYMOTIC DISEASES.

Registered during the Twelve Months ending Saturday, December 31, 1870.

WARDS.	Small-pox.	Measles.	Scarlatina.	Diphtheria.	Croup.	Whooping-cough.	Typhus Fever.	Typhoid Fever.	Cholera.	Cholera Infantum.	Cholera Morbus, Other Diarrhœal Diseases.	Yellow Fever.	Other Zymotic Diseases.	Total Deaths from Zymotic Diseases.	Total Deaths from all Causes.	Total Population (in Wards), Census of 1870.	Percentage of Zymotic Deaths on Total Mortality.	Death-rate per 1,000 Annually of the Population from Zymotic Causes.	Death-rate per 1,000 Annually of the Population from all Causes.	REMARKS.
First	1	3	4	7	9	2	..	3	..	25	52	..	22	138	443	14,463	31.15	9.54	30.63	Castle Garden and E. Depot, 10.
Second	....	....	....	1	....	....	..	1	..	.....	2	..	2	6	45	1,312	13.33	4.57	34.30	
Third	1	....	2	....	2	....	..	....	..	3	2	..	6	16	78	3,715	20.51	4.30	20.99	
Fourth	2	4	20	10	14	3	2	4	..	28	53	..	40	180	657	23,787	27.40	7.57	27.62	
Fifth	1	3	28	9	12	5	..	11	..	17	37	..	14	137	473	17,152	28.96	7.98	27.58	New York Hospital, 8.
Sixth	1	6	18	4	21	10	4	7	..	21	55	..	56	203	736	21,152	27.96	9.59	34.32	City Prison, 18; Reception Hospital, Centre street, 51.
Seventh	4	9	59	14	21	18	..	11	1	71	87	..	50	345	1,119	44,819	30.83	7.69	24.97	
Eighth	7	4	26	7	14	4	3	14	1	45	78	..	36	239	915	34,913	26.12	6.84	26.21	
Ninth	5	11	51	15	20	10	1	22	..	43	75	..	45	298	1,108	47,607	26.89	6.26	23.27	St. Vincent's Hospital, 123; Jefferson Market Prison, 2.
Tenth	9	10	50	16	22	6	..	13	..	40	104	..	32	302	995	41,411	30.35	7.29	24.03	Essex Street Jail, 2.
Eleventh	23	22	65	30	36	12	13	29	..	79	177	..	47	543	1,754	64,230	30.95	8.45	27.31	St. Francis' Hospital, 109.
Twelfth	2	40	68	19	22	12	24	89	..	140	252	..	263	931	2,166	47,495	42.98	19.60	45.61	Infants' Hospital, 432; Idiot Asylum, 1; Relapsing Fever Hospital, 102; Colored Orphan Asylum, 13; House of Mercy, 12; Ward's Island, 496; Randall's Island, 46; Bloomingdale Lunatic Asylum, 30; New York Juvenile Asylum, 3; House of Refuge, 6; House of Good Shepherd, 22; Deaf and Dumb Asylum, 14; St. Joseph's Home 9.

Thirteenth.....	7	15	37	10	19	10	2	6	..	45	94	1	17	263	902	33,365	29.16	7.88	27.03	
Fourteenth.....	4	6	29	8	22	4	3	8	..	42	73	..	35	234	760	26,431	20.79	8.85	28.76	Lying-in Asylum, 1.
Fifteenth.....	3	....	5	5	9	2	1	8	..	23	275	..	57	388	991	27,586	39.15	14.06	35.92	Foundling Hospital, 540.*
Sixteenth.....	8	10	33	21	14	14	..	17	..	48	75	1	40	276	1,009	48,360	27.35	5.70	20.86	
Seventeenth....	67	40	111	30	38	19	6	31	..	141	281	..	54	818	2,473	95,411	33.08	8.57	25.92	Eye Infirmary, 1.
Eighteenth.....	25	23	69	16	21	8	3	11	..	84	101	..	48	409	1,383	59,598	20.58	6.86	23.20	Home for Respectable Aged and Indigent Females, 6.
Nineteenth.....	111	3	120	22	24	18	24	68	1	99	327	..	193	1,010	3,457	86,055	28.96	11.74	40.53	Workhouse, 551; Inebriate Home, 3; Industrial School, 1; Woman's Hospital, 13; German Hospital, 89; City Lunatic Asylum, 130; Almshouse, 140; Penitentiary, 12; Small-pox, 107; Charity Hospital, 671; Epileptic and Paralytic Hospital, 31; Colored Home Hospital, 138; Nursery and Child's Hospital, 127; St. Luke's Hospital, 135; Fever Hospital, 66; Roman Catholic Orphan Asylum, 18.
Twentieth.....	1	45	69	19	28	17	3	24	..	95	182	..	94	577	1,912	75,318	20.17	7.66	25.38	Mount Sinai Hospital, 49.
Twenty-first....	4	6	28	9	17	6	1	19	..	35	112	1	137	375	2,087	56,709	17.97	6.61	36.80	Bellevue Hospital, 1,098; Home of the Friendless, 2.
Twenty-second..	12	28	83	36	26	21	6	26	1	94	230	..	53	626	1,692	71,362	36.99	8.77	23.71	Old Ladies' Home, 3.
Totals.....	293	298	975	308	421	201	96	422	4	1,328	2,734	3	1,341	8,314	27,175	942,252	30.56	8.82	28.84	Total Deaths in Public Institutions.....4,945

* Five hundred and ninety-seven deaths were registered as having occurred in the Foundling Hospital. Fifty-seven of these, however, were foundlings who had died outside of the institution. They are included in the two hundred and eighty-six such deaths contained in the special statistics of that Hospital.

in regard to exposure to contagion, and the greater facilities offered to women for revaccination.

It was remarked that in the latter part of 1869 this disease was peculiarly prevalent and fatal among the Germans, and as the epidemic of 1870 was but a continuation of that which we have just mentioned, it was distinguished by the same peculiarity. As a consequence we discover, upon examining the nationality of those who died from small-pox, that the native element contributed but 190 deaths (notwithstanding the large proportion of children), while 103 foreigners perished by the disease. Reviewing the history of former visitations back to 1855, we find none characterized by so small an excess of natives over foreigners, as the subjoined statement illustrates.

DEATHS FROM SMALL-POX ACCORDING TO NATIVITY. *

YEAR.	1855.	1856.	1857.	1858.	1860.	1861.	1862.	1864.	1865.	1869.	1870.
Native.....	81	331	383	446	251	519	220	303	541	153	190
Foreign.....	19	65	51	65	48	97	49	91	133	50	103

The sudden reappearance of small-pox in November, 1869, and its almost as sudden cessation in the spring of 1870, furnish an additional proof of what has so often been observed in relation to small-pox, that although its violence as a disease has without doubt been enormously tempered by vaccination, yet its successive and inevitable recurrence as an epidemic takes place in accordance with occult laws which no one as yet comprehends. Thus, also, it was noticed in Scotland during the year 1858, before the adoption of the Compulsory Vaccination Act, that small-pox, although prevalent, was less fatal and widespread than in 1865, two years subsequent to the first enforcement of said act. The terrible visitation from which the city of Paris suffered during 1870 is another illustration of the same fact.

In a late report of the Registrar-General the following statement appears: "In the 31 years, 1840–70, the deaths from small-pox in London were 25,071, giving a weekly average of 16. During this period the disease may be said to have been epidemic nine times, and in nearly all these instances it appeared in the latter part of the year,

* The table of deaths from small-pox on page 192 of the Annual Report for 1869 is incorrect, deaths from varicloid having been omitted, and the figures for 1866, '7, and '8 being wrong.

and lasted from one to two years. The nine epidemics occurred in 1840–1, 1844–5, 1847–8, 1851–2, 1854–5, 1859–60, 1862–3–4, 1866–7, and 1870–1. The highest numbers returned in any years were 1,804 in 1844, and 2,012 in 1863. The most severe visitation, although of comparatively short duration, was that of 1840–1, when the highest weekly number in the 31 years occurred, viz.: 102 deaths in the last week of 1840.* The three years of lowest mortality from small-pox were 1853, 1857, and 1861, when the deaths were only 217, 154, and 215, in each year respectively."

Comparing our own experience with that detailed above, we find that within the same period of 31 years the deaths from small-pox in New York have amounted to 9,423, a weekly average of 5.8. The 31 years have included seven epidemics, the latter part of the year having generally been their starting-point. They occurred as follows: 1840–1–2–3, 1845–6, 1848–9–50–1–2–3–4, 1856–7–8, 1860–1–2, 1864–5, and 1869–70, the periods of quiescence being usually much more brief than in London, and the epidemics of longer continuance. The greatest numbers registered in any years of those mentioned were 681 in 1853, and 624 in 1854, which were but portions of a remarkably long visitation extending with more or less severity over seven years. There were three years of notably low mortality, viz.: 1844, when but 21 deaths were recorded; 1867, 19; and 1868, 25. With the exception of the last year referred to, the disease was violent in London during the periods of abatement in New York, while, during the three years of least activity in London, its ravages were reciprocally excessive in New York.

Measles.

The deaths from measles (298) were far behind those in 1869, when they numbered 531. Of the 298 only two were in adults, and the vast majority (275) were, as formerly, in children of less than five years old. The character of the disease was not unusual, bronchitis and pneumonia being its principal complications.

Scarlatina.

This scourge of childhood was exceptionally fatal, particularly in the first and fourth quarters, destroying 975 lives altogether, a greater

* In week ending May 6, 1871, they reached 988 in London.

mortality than it had occasioned in any former year since 1861. The failure of many physicians to comply with the regulation of this Department, requiring reports of all contagious diseases, has had the effect of preventing in many cases those important sanitary measures against the infection of scarlatina which the City Sanitary Inspector is always ready to execute, and which, it must be acknowledged, would, if extensively employed, circumscribe the spread and diminish the mortality of this disease. Were such reports universally made, the distinctive features of each epidemic could be noted and new clues given to scientific investigation. The mortality from scarlatina is, perhaps, less than that from any other zymotic disease, a true index of its extent and comparative fatality; or, in other words, of its *type*.

Diphtheria and Membranous Croup.

These two diseases, often confounded in certificates of death, presented nothing worthy of special notice. Three hundred and eight deaths were ascribed to the former and 421 to the latter, children being the chief sufferers.

Whooping Cough.

There were 201 deaths from whooping cough, a decrease of 157 as compared with the preceding year; 79 were males and 122 females. The large preponderance of females over males is very remarkable, but is quite characteristic of this affection, as we discover upon referring to former years. As far as we are aware it is unaccountable.

Typhus, Typhoid, and Relapsing Fevers.

Typhus fever occasioned 96 deaths, and typhoid fever 422. The mortality from the latter was somewhat excessive when contrasted with that of the preceding year. A compensation, however, was afforded in the low mortality from its analogous affection, typhus, which destroyed only 96 lives, as has been said. This decline in the prevalence and fatality of typhus fever has been constant since 1864, while on the contrary typhoid fever has shown a decided tendency to revert towards the large mortality which it produced in 1863, 1864, 1865, and 1866. The table annexed exhibits the greater or less prevalence of these two fevers during the past four years in each ward of the city, it being remembered that the Twelfth, Nineteenth, and Twenty-first Wards

contain large public institutions, whose inmates are brought from every quarter of the town to swell their aggregate of mortality. Keeping this fact in view, it will be perceived that typhus fever, during the past year, was most fatal in the Sixth, Eighth, Fourteenth, Seventeenth, Eighteenth, Twentieth, and Twenty-second Wards, and typhoid fever in the Fifth, Seventh, Eighth, Ninth, Tenth, Eleventh, Sixteenth, Seventeenth, Eighteenth, Twentieth, and Twenty-second Wards, the latter disease being particularly malignant among the overcrowded population of the Ninth, Eleventh, Seventeenth, and Twentieth Wards. These four wards include one quarter of the whole population, crowded upon one twelfth of the total area of the city, and within the past two years their mortality from typhoid fever has in each far exceeded that of any other ward (aside from those excluded above). The Seventeenth Ward, especially, with its population of almost 100,000, upon an area of little more than half a square mile, and the Eleventh, with 64,000 upon three-tenths of a square mile, annually furnish in their death-rate from typhoid fever the most significant commentary upon the wretchedness and filth of their vast tenements.

Relapsing fever, the one nearest cognate to the two last reviewed, carried off 184 persons, of whom 109 were males and 75 females. Only four were children less than five years old, and but 14 those not arrived at adolescence. Out of something over a thousand cases reported to the Bureau of Sanitary Inspection between May 1 and December 31, 1870, whose ages were ascertained, 18 per cent. were under 15 years of age. Of the whole number of cases, only 24 were less than five years old, nine less than two years, and but a single case under one year old. It would appear from these figures that the system in childhood and infancy is somewhat less obnoxious to the infection of this disease than to that of typhus fever, and very much less susceptible to it than to that of typhoid.

The epidemic of relapsing fever in Philadelphia during the past year was marked by a similar peculiarity. Out of 162 deaths only 4 were of persons less than 15 years old—3 of those under 5, and 1 of infants under 1.

There the colored population suffered to the remarkable extent of 66 per cent. upon the total mortality. Here but eight persons of negro extraction fell victims to the disease.

Number of Deaths from Typhus Fever and Typhoid Fever in the several Wards of the City of New York during the Years 1867, 1868, 1869, and 1870.

Wards.	1867.		1868.		1869.		1870.	
	Typhus.	Typhoid.	Typhus.	Typhoid.	Typhus.	Typhoid.	Typhus.	Typhoid.
First	3	10	.....	5	2	4	....	3
Second	.....	2	.....	.....	1	.....	....	1
Third	.....	1	.....	1	.....	.....	....	....
Fourth	5	4	5	3	2	14	2	4
Fifth	4	16	6	14	3	14	....	11
Sixth	6	5	.....	5	3	13	4	7
Seventh	5	12	1	3	5	10	....	11
Eighth	7	18	.....	11	3	11	3	14
Ninth	1	30	1	9	5	19	1	23
Tenth	3	11	7	12	3	11	....	13
Eleventh	16	22	11	17	9	19	13	29
Twelfth	45	57	52	111	30	94	24	89
Thirteenth	3	4	7	6	1	7	2	6
Fourteenth	7	13	1	7	3	6	3	8
Fifteenth	.....	7	4	5	1	8	1	8
Sixteenth	.....	14	3	7	1	4	....	17
Seventeenth	8	23	12	11	21	26	6	31
Eighteenth	7	12	2	6	4	14	3	11
Nineteenth	44	27	17	41	11	51	24	68
Twentieth	3	18	5	21	7	24	3	24
Twenty-first	4	16	3	19	5	13	1	19
Twenty-second	7	20	2	12	5	16	6	26
Total	177	342	*139	*326	125	378	96	423

* In the Consolidated Yearly Abstract for 1868 the deaths by typhus appear as 137, and those by typhoid as 329. The figures in the table above are the result of adding together these deaths, as they are given in the four Quarterly Zymotic Abstracts for 1868.

As we have observed, the mortality from relapsing fever increased rapidly during the winter and spring, and then subsided gradually until by the close of the year its entire disappearance seemed imminent. Its history shows it to have prevailed here, as in other cities, almost exclusively among the most wretched denizens of haunts of squalor and degradation. Poverty and starvation were its foster-parents. The sanitary precautions of the Board prevented its continued presence in any one locality, and on account of those suffering from it being removed, as soon as discovered, to the Island hospitals, its deaths were restricted mainly to those institutions. The weekly course of mortality from typhus, typhoid, and relapsing fevers is presented in the following comparative statement:

WEEK ENDING.	Deaths by Typhus.	Deaths by Typhoid.	Deaths by Relapsing Fever.	WEEK ENDING.	Deaths by Typhus	Deaths by Typhoid.	Deaths by Relapsing Fever.
January 8	3	8	.....	July 9	1	7	4
" 15	1	9	.....	" 16	3	7	3
" 22	1	4	.....	" 23	.....	10	3
" 29	3	9	.....	" 30	1	9	.....
February 5	3	4	2	August 6	2	6	2
" 12	4	14	2	" 13	6	8	1
" 19	3	9	9	" 20	1	11	4
" 26	3	5	5	" 27	2	16	1
March 5	1	8	3	September 3	.....	3	2
" 12	1	4	1	" 10	2	10	2
" 19	4	4	8	" 17	.....	18	.....
" 26	2	10	8	" 24	.....	13	.....
April 2	3	13	7	October 1	.....	14	3
" 9	1	10	13	" 8	1	14	.....
" 16	1	7	12	" 15	3	11	1
" 23	4	3	9	" 22	3	6	2
" 30	1	4	8	" 29	1	7	.....
May 7	3	8	7	November 5	1	9	.....
" 14	1	3	4	" 12	.....	7	.....
" 21	5	2	9	" 19	2	14	.....
" 28	6	3	5	" 26	2	10	.....
June 4	3	9	6	December 3	4	9	.....
" 11	3	6	10	" 10	1	9	2
" 18	3	5	7	" 17	1	9	1
" 25	.....	6	1	" 24	1	9	2
July 2	.....	5	15	" 31	.....	5	.....
				Total	96	422	184

Yellow Fever.

Three deaths by this formidable disease were registered within the year. Its outbreak during August upon Governor's Island—its non-recognition until the suspicions of the Board were directed to its place of origin by its appearance in the city—its demonstration by the medical members of the Department—and the prompt and effectual measures pursued for its suppression—are matters upon which it is beyond our province to expatiate. Up to October 2, there had been no deaths from this disease returned upon physicians' certificates. It has since been established that previous to that date there had occurred six unequivocal cases with a fatal termination, which, however, had been under the treatment of gentlemen inexperienced in the affection and unconscious of its existence in New York or vicinity. These cases were returned and registered under the following heads: typhus fever, remittent fever, pernicious remittent fever, hepatitis, coma, and paralysis. During October three fatal cases were recognized by their medical attendants and properly reported. There were, therefore, nine deaths in the city from yellow fever demonstrated to have occurred within the year, all of which cases were proven to have originated upon Governor's Island.

Remittent and Intermittent Fevers.

These two diseases were credited with 147 and 66 deaths respectively, being in each case a large excess over former years. The influences which contributed to this undue mortality have been sufficiently indicated in another portion of our report.

Diarrhœal Diseases.

We employ this term to designate the great group of intestinal disorders which are dependent upon zymotic influences. In former reports, as in this, they have been specified under several appellations, viz.: dysentery, diarrhœa, cholera, cholera morbus, cholera infantum, and entero-colitis. Enteritis and gastro-enteritis have been excluded from the list, although the vast majority of affections reported under those titles could have been as properly designated diarrhœa or cholera in-

fantum, and would have found their appropriate place along with their kindred diseases. Experience has convinced us of the futility of attempting to make a just and well-drawn distinction between diarrhœa, cholera infantum, and entero-colitis, as they appear upon infants' certificates of death. Were a number of physicians to attend a case of what is vulgarly called "summer complaint," and each to furnish a certificate, any of the following terms might be selected to specify the cause of death, viz: enteritis, gastro-enteritis, intestinal catarrh, gastro-intestinal catarrh, entero-colitis, cholera infantum, diarrhœa, cholera morbus, and even dysentery where no dysentery existed. Each of these terms is employed by individual practitioners to define one and the same affection, as our returns constantly demonstrate. It is far beyond our intention to imply that careful and scientific physicians do not use definite names to identify positively special varieties of these diseases; but as most of the diarrhœal mortality occurs among the children of the poor, the great mass of certificates come from doctors who spend little time in analyzing cases or making diagnoses more accurate than necessary. The more specific returns are therefore swallowed up and rendered valueless as a foundation for any statistical expression.

It has been the custom in this Bureau, in relation to deaths certified as from cholera infantum, to classify only those cases under that head in which the duration of the disease did not exceed one week; but in those certified as from diarrhœa, that term was retained unless the disease had a very brief existence, say of from one to two days. It is manifest that such an arrangement was entirely arbitrary, and if the two diseases were to be regarded as distinct, failed to fulfil its purpose. The fact must be acknowledged that we have no means available for statistically separating these two affections occurring in young children, and, therefore, our deductions must be drawn from their consolidation. Entero-colitis is but another and more definite term employed by some for a disease returned by many others as diarrhœa or cholera infantum, and is, therefore, not worthy of separate consideration.

Dysentery is not unfrequently assigned as a cause of death in cases (more particularly juvenile), where dysentery proper was not present at all, and in adults the term chronic dysentery often signifies chronic diarrhœa. In other cases both diseases exist, without our being able to determine from the certificate which was the prominent one. In view

of the fact that the peculiar type of dysentery, which is propagated by contagion, and becomes epidemic, may arise at any juncture, this indefiniteness is unfortunate.

In many instances of death from enteritis and gastro-enteritis we experience more difficulty still. These cases increase during the hot weather in a direct ratio with the enteric disorders classified as zymotic, and their origin is doubtless from zymotic causes in the majority of infantile deaths. As, however, it would be obviously improper to place all of these cases under the zymotic head, and as it is impracticable to separate the true zymotic cases from those simply local in character, we have been compelled to retain all of them in the "digestive system," under the local class.

We have endeavored to obviate this trouble by having printed upon the back of the new certificates of death a request, among others, that physicians will distinguish in their returns between the zymotic and the purely local varieties of these two disorders.

Three thousand nine hundred and fifty-six persons were cut off during the year by diarrhœal affections. They were consequently, next to phthisis, the most destructive agents of death, their action being, however, most potently directed against childhood, while phthisis attacks maturity more particularly. 2,614 or 66 per cent. of these deaths occurred among children less than one year old, 3,401 or 86 per cent. among those less than two, and 3,505 or 88 per cent. among those less than five. If we compare these results with those of 1869 we shall discover that during the past year diarrhœal diseases were not only largely in excess (by 822) over 1869, but were also infinitely more destructive of infant life; as but 1,885 or 60 per cent. of those cut off in 1869 were less than one year old, 2,494 or 79 per cent. under two, and 2,676 or 85 per cent. under five.

Syphilis.

This curse of human kind occasioned 106 deaths, of which 61 were males and 45 females. The number was large, only 77 deaths having been attributed to the same cause in each of the two preceding years. The majority of such deaths (91) were, as in former years, the result of congenital disease, which providentially cut off the unfortunate offspring upon whose innocent heads had been visited the parental sin. A large number of these were hospital cases.

Glanders.

A case of this rare disease occurred in the person of Michael O'Keefe, a carman, who died on July 8th. Its history is graphically related in a communication from the attending physician, which we herewith append on account of its peculiar interest for the profession.

NEW YORK, *July* 9, 1870.

CHARLES P. RUSSEL, M.D.:

DEAR SIR—In compliance with your request, I send you such particulars of O'Keefe's case as I find in my note-book:

Michael O'Keefe began to complain,

June 8–10, of swelling of the right axillary glands, difficulty and pain in moving the right arm, general indisposition, lowness of spirits, and wandering pains.

June 12.—Severe pain in the right supra-orbital region; redness and swelling of the right upper eyelid. He supposed he had taken cold sleeping on a rock, or had been bitten by some insect or reptile, and did not seek advice until the 14th of June.

June 14.—Conjunctivitis well marked; intolerance of light; tongue furred; little or no fever.

June 18.—An abscess began to form about the left knee; it was opened, and discharged freely a thin, sanious matter.

June 20.—Diffused cellular inflammation appeared in successive spots on the upper and lower limbs, but pus did not find its way to the surface; and before fluctuation was discernible the inflammation began to subside in that spot, only to appear in another. The pain from these was intense.

June 25.—Pain in the back and limbs, great thirst, no chest symptoms; fresh blood in the evacuations, which otherwise were natural, though they occurred three or four times a-day.

June 30.—Diarrhœa; five or six passages in twenty-four hours, all thin, watery, sour, and offensive. A little tenderness on pressure over the abdomen, thirst urgent; phlegmons constantly appearing, but confined to legs and arms.

July 3.—Sleeps little, slightly delirious, blood disappeared from evacuations, which still continued frequent. An offensive, viscid discharge, streaked with blood, comes from the nostrils.

July 6.—A crop of hard pustules appeared, first on the face, then on lower limbs, then on neck and body. The contained matter was thick, and showed no disposition to run out even when the pustule was divided, but to spread laterally to the extent of half or three-quarters of an inch in diameter. All the old phlegmons now disappeared.

July 8.—Delirium; tremors; death.

No autopsy; the family probably would not have permitted it, and the attending physician was certainly not hankering for it.

O'Keefe was a carman. He stated that several months ago his horse had a swelling of the sub-maxillary gland, followed by a discharge of yellowish matter and blood from the nostril. The animal is still living, and has at present a discharge from one nostril.

The treatment for the conjunctivitis was sol. argent. nit. gr. iii. to the oz., dropped in three or four times a day, leeches, ice. Poultices to the phlegmons afforded most relief. Constitutional treatment was meat-broths, rare meat, milk-punch, quinine, iron, brandy, wine, opiates.

Very respectfully,

E. O. COWLES.

Hydrophobia.

There were reported three fatal cases of this horrible affection—two in March and one in November—the symptoms not having appeared in the animal or the man during the summer season in either instance.

In each the period of incubation was brief—from one to two months. One of them followed the bite of a bitch in heat, not known to have shown signs of hydrophobia. The ages of the victims were respectively 17, 9, and 3 years, and they were all males.

These instances are so many additional proofs of the fact that hydrophobia is not confined to any particular period of the year, and is moreover, notwithstanding the popular impression, even less prevalent in summer than in either of the other seasons. A report made by a committee to the American Medical Association in 1856, embodied the history of 102 cases of *rabies canina*, and furnished the following statistics: "31 cases occurred in the spring, 21 in the summer, 27 in the autumn, and 23 in the winter."

ALCOHOLISM.

There were registered within the year 302 deaths from intemperance and delirium tremens, or an average of about six weekly. Of these, 48 were native males and 17 native females; 158 foreign males and 79 foreign females. During the past two years there occurred as many deaths from intemperance as had been recorded for the five years previous to 1869, and its unfortunate victims are daily increasing. All of such cases were those in which alcoholism was recognized as the direct and prominent cause of death, and the majority of them came under the observation of the coroners. It is impossible to estimate the number which, although not directly referable to intemperance, were really

dependent upon the inordinate consumption of alcohol, which, literally "preying upon the vitals" of those within its grasp, engenders complex and protean forms of disease. Of these, Bright's disease and cirrhosis of the liver are known to be the most common. Accurate statistics of all cases in which intemperance has been recognized and reported as an agent will be gathered during the present year, and we trust that the profession will respond to the inquiry for that purpose printed upon the back of the new certificates of death. The figures resultant will assuredly be more instructive and eloquent than words.

CONSTITUTIONAL DISEASES.

Constitutional diseases of all kinds caused 6,329 deaths, of which 3,249 were males and 3,080 females. Without dwelling upon them as a class we shall proceed to the examination of their most important varieties.

Diathetic Diseases—Gout and Rheumatism.

Only two deaths were accredited to gout, there having been one in 1869 and four in 1868. Although not an uncommon disease among the better classes of this city, it is happily a rare cause of death.

Rheumatism, the more general and fatal affection of the two, was the direct cause of 67 deaths, a slight increase upon each of the previous two years. It is difficult to determine its remote instrumentality in destroying life, particularly in the case of heart diseases, most of which are not certified as dependent upon any indirect cause.

Dropsy.

One hundred and sixteen deaths were attributed to dropsy, against 230 in 1869. 103 cases were registered during the first six months of the year. As it has been our rule to return all certificates of only "Dropsy" for additional information, we have generally succeeded in arriving at the original cause, and as a result the mortality from this disease has diminished remarkably within the past nine months.

Cancer.

Cancer, as usual, figured conspicuously as a cause of death, having proved fatal in 355 instances—245 being females and 110 males—about

the ordinary proportion of the sexes, but a marked excess of mortality over the two previous years. The statistics of this disease as to location are more than ordinarily interesting in the present report, as the frequent carelessness of physicians formerly in neglecting to designate the region or organ implicated has been corrected by returning such certificates for rectification. In only two cases have we failed to elicit the necessary information, the other 17 cases of unspecified location having been registered before June 1. Cancer of the stomach, liver, and uterus, together constitute about two-thirds of all the cases. Cancer of the breast carried off 41 women and 1 man. Almost every portion of the human frame is represented in these statistics.

Tubercular Diseases—Phthisis Pulmonalis.

Tubercular diseases produced 5,778 deaths, of which 4,030 were the result of phthisis pulmonalis. Of the latter 2,097 were males, and 1,933 females. The mortality from this affection was both positively and relatively large when compared with that of the previous four years, as will be seen by the following statement:

Year.	1866.	1867.	1868.	1869.	1870.
Deaths from Phthisis	3389	3348	3414	3364	4030
Percent. on total mortality	12.2	14.4	13.7	13.3	14.8

December, as in 1869, was by far the most unpropitious month for consumptives, 443 having been cut off during that period against 350 in March, the next in order of fatality. September, October, and November severally came next, June, July, and August standing low on the list. 1,879 deaths took place in the first six months, and 2,151 in the last six months. During September the mortality from phthisis rose and remained high until in the month of December it reached 19 per cent. upon the monthly total. The meteorological conditions of these four months were not of a character to explain this excess. During each of them the temperature continued higher than their average for ten years back, there was somewhat more rainfall in October, but less in November and December than their mean for the same period

Abstract of the Record of Deaths by Phthisis Pulmonalis in the City of New York, in the Twelve Months ending December 31, 1870.

Showing Nativity, Color, Ages, Sexes, Classes of Occupation, Length of Residence in the City; also the Months and Wards in which these Deaths occurred; also the Number of such Deaths in various public Institutions.

MONTHS.	NATIVITY.												LENGTH OF RESIDENCE IN THE CITY.				COLOR.		TOTAL.		GRAND TOTAL.
	NATIVE.			IRISH.			GERMAN.			OTHER FOREIGN COUNTRIES.											
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Less than 5 years.	From 5 to 10 years.	10 years and upwards.	Unknown.	White.	Colored.	Males.	Females.	
January	57	46	103	76	76	152	34	17	51	15	10	25	40	36	248	7	329	9	181	150	331
February	51	45	96	62	55	117	37	21	58	14	8	22	28	30	218	7	260	13	160	133	293
March	60	56	116	69	70	139	43	19	62	25	8	33	56	39	239	16	320	20	190	160	350
April	45	40	85	53	67	120	23	14	37	13	8	21	29	25	193	16	258	5	133	130	263
May	35	43	78	70	52	122	31	22	53	12	17	29	34	26	206	16	277	5	151	131	282
June	75	59	134	66	67	133	46	26	72	19	2	21	52	39	253	16	352	8	197	163	360
July	46	54	100	64	81	145	24	22	46	16	14	30	45	37	221	18	317	4	147	174	321
August	52	51	103	47	75	122	32	20	52	11	16	27	43	28	219	14	296	8	147	157	304
September	65	62	127	70	112	182	41	22	63	10	10	20	44	36	300	12	380	12	188	204	392
October	62	49	111	72	74	146	33	16	49	16	13	29	38	28	251	18	328	7	186	149	335
November	61	59	120	74	78	152	40	22	62	18	4	22	47	36	250	23	348	8	187	169	356
December	72	81	153	88	91	179	42	24	66	20	25	45	49	27	344	23	431	12	220	213	443
Total	681	645	1,326	811	898	1,709	426	245	671	189	135	324	515	387	2,942	186	3,919	111	2,097	1,933	4,030

Abstract of Mortality from Phthisis Pulmonalis, &c.—(Continued).

MONTHS.	Under 1 Year.		From 1 to 2 Years.		From 2 to 3 Years.		From 3 to 4 Years.		From 4 to 5 Years.		From 5 to 10 Years.		From 10 to 15 Years.		From 15 to 20 Years.		From 20 to 25 Years.		From 25 to 30 Years.		From 30 to 35 Years.		From 35 to 40 Years.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
January	....	....	2	1	3	....	1	2	....	....	4	2	....	1	6	10	21	20	24	17	24	18	24	21
February	....	....	2	....	3	2	....	2	....	....	....	1	2	1	7	4	19	24	27	18	21	19	21	13
March	....	....	4	2	1	2	1	1	....	2	2	1	4	6	5	11	24	16	19	26	26	17	21	15
April	....	....	1	3	1	1	1	1	....	....	1	2	4	....	7	5	15	20	19	17	18	20	17	16
May	....	....	1	4	2	....	....	....	1	....	....	1	3	1	3	7	14	22	12	22	25	10	14	18
June	7	4	2	....	1	1	1	....	1	....	4	4	3	3	13	14	18	19	36	16	22	22	17	14
July	6	2	3	2	....	1	....	....	....	1	....	3	....	4	1	17	12	19	20	22	19	27	20	23
August	....	2	3	2	3	3	1	2	....	....	1	2	1	4	5	11	17	25	19	26	21	16	18	22
September	3	3	2	3	....	2	....	....	1	....	1	....	....	4	11	13	20	29	28	30	21	22	20	21
October	2	4	3	3	1	2	1	....	....	....	1	2	1	1	9	8	19	14	26	25	26	19	20	18
November	3	1	5	1	3	2	1	....	....	....	1	2	2	1	8	7	23	26	25	25	24	22	14	24
December	1	....	4	....	1	1	1	....	....	....	1	....	2	4	8	18	29	34	35	27	28	25	20	23
Total	22	16	32	21	19	17	8	8	3	6	17	21	23	31	83	125	231	268	300	271	273	237	226	238
	38		53		36		16		9		38		54		208		499		571		510		464	

MONTHS.	From 40 to 45 Years.		From 45 to 50 Years.		From 50 to 55 Years.		From 55 to 60 Years.		From 60 to 65 Years.		From 65 to 70 Years.		From 70 to 75 Years.		From 75 to 80 Years.		From 80 to 85 Years.		From 85 to 90 Years.		From 90 to 95 Years.		From 95 to 100 Years.		Total.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
January	13	15	11	13	13	9	14	7	14	8	5	4	1	2	1	....	....	....	....	....	....	....	....	....	321
February	9	10	13	11	13	13	6	8	6	2	7	3	3	1	1	2	....	....	....	....	....	....	....	....	293
March	14	12	23	5	17	9	10	12	5	10	10	4	2	2	2	5	....	1	....	....	....	1	....	....	350
April	14	8	14	9	11	9	5	4	3	4	3	3	3	4	....	1	1	2	....	1	....	....	....	....	293
May	19	14	18	9	6	13	11	....	6	2	11	6	2	1	2	....	1	1	....	....	....	....	....	....	282
June	22	19	14	12	13	8	6	5	3	3	6	2	5	2	2	2	1	1	....	1	....	1	....	....	360
July	18	22	16	7	8	6	5	5	11	6	3	3	4	3	....	1	....	1	1	....	....	....	....	....	321
August	9	8	14	8	11	6	10	9	5	4	4	3	3	2	1	1	....	1	1	....	....	....	....	....	304
September	23	20	7	13	19	12	13	10	8	6	2	4	5	7	1	1	....	....	....	1	....	....	....	....	302
October	16	15	22	11	17	9	5	7	7	3	2	3	5	3	1	1	1	....	....	1	....	....	....	....	315
November	18	12	17	9	11	13	10	6	3	8	3	6	4	1	....	....	....	1	1	....	....	....	1	....	156
December	21	26	21	17	13	10	13	1	12	11	8	4	6	6	4	1	....	2	....	1	....	....	1	....	413
Total	196	181	190	121	152	117	108	74	83	67	64	45	43	34	15	15	4	10	3	5	....	2	2	....	4,030
	377		311		269		182		150		109		77		30		14		8		2		2	

Abstract of Mortality from Phthisis Pulmonalis—(Continued).

WARDS.	Under 1 year.	From 1 to 2 years.	From 2 to 3 years.	From 3 to 4 years.	From 4 to 5 years.	From 5 to 10 years.	From 10 to 15 years.	From 15 to 20 years.	From 20 to 25 years.	From 25 to 30 years.	From 30 to 35 years.	From 35 to 40 years.	From 40 to 45 years.	From 45 to 50 years.	From 50 to 55 years.	From 55 to 60 years.	From 60 to 65 years.	From 65 to 70 years.	From 70 to 75 years.	From 75 to 80 years.	From 80 to 85 years.	From 85 to 90 years.	From 90 to 95 years.	From 95 to 100 years.	TOTAL.
First	....	3	....	....	....	1	....	2	4	8	6	9	6	3	2	8	4	.. ..	1	1	....	1	....	1	60
Second	....	....	....	....	....	....	....	....	....	1	....	....	1	....	1	....	....	....	1	....	....	....	....	....	4
Third	....	....	....	....	....	....	....	....	1	2	2	1	2	....	1	1	....	1	1	....	....	....	....	....	12
Fourth	3	2	....	2	....	3	1	5	8	5	13	15	14	15	7	3	2	2	2	....	....	1	....	....	103
Fifth	2	1	....	2	....	....	....	8	4	9	8	14	10	4	7	4	1	1	1	....	....	....	....	....	76*
Sixth	4	2	....	1	....	....	2	5	8	10	9	9	9	11	8	7	10	4	4	....	1	....	....	1	105†
Seventh	2	4	3	1	....	1	....	12	26	27	20	21	19	12	11	6	6	6	3	3	1	1	....	....	185
Eighth	1	3	7	....	2	2	2	8	17	19	19	12	13	15	5	6	9	....	2	1	....	....	....	....	143
Ninth	1	1	1	1	....	3	5	15	36	28	27	27	11	10	16	12	7	8	3	1	1	....	....	....	214‡
Tenth	2	1	2	1	....	....	2	5	12	26	21	17	13	11	15	8	4	3	....	....	1	....	....	....	144
Eleventh	2	1	1	2	....	3	3	16	34	37	32	40	23	26	14	11	10	10	2	....	....	....	....	....	267§
Twelfth	8	6	1	2	1	7	8	16	47	34	29	23	19	15	8	6	9	4	4	1	....	....	....	....	248‖
Thirteenth	....	....	2	....	....	1	1	6	13	15	12	20	15	14	6	7	8	2	2	1	....	1	1	....	127
Fourteenth	4	3	1	....	....	....	4	8	14	14	20	17	13	6	17	10	6	1	4	3	....	....	....	....	145¶
Fifteenth	1	....	....	....	....	....	....	....	6	4	6	6	9	2	6	2	4	1	1	....	....	1	....	....	49
Sixteenth	1	1	1	....	....	2	3	10	21	25	20	17	13	10	9	4	5	4	2	1	....	....	....	....	149
Seventeenth	1	6	6	....	2	1	9	26	46	49	34	30	23	30	18	10	5	10	5	2	1	1	....	....	315
Eighteenth	....	1	....	2	1	4	2	5	25	33	23	21	18	16	12	15	2	6	6	3	....	....	....	....	195
Nineteenth	....	3	4	....	2	6	7	21	58	99	75	66	54	54	52	34	24	20	14	7	5	....	1	....	606**
Twentieth	2	5	4	1	1	1	3	15	36	42	33	33	23	16	16	5	13	12	3	2	1	2	....	....	269††
Twenty-first	....	4	2	....	....	1	2	17	61	61	77	44	53	29	24	15	14	10	10	3	2	....	....	....	429‡‡
Twenty-second	4	6	1	1	....	2	....	8	22	23	24	22	16	15	14	8	7	4	6	1	1	....	....	....	185§§
Total	38	53	36	16	9	38	54	208	499	571	510	464	377	314	269	182	150	109	77	30	14	8	2	2	4,050

* Fifth Ward .. .. Including 1 in Hospital.

† Sixth Ward ..... Including 1 in Hospital.

‡ Ninth Ward ..... Including 57 in Hospitals.

§ Eleventh Ward ..... Including 53 in Hospitals.

‖ Twelfth Ward ..... Including 128 in Hospitals.

¶ Fourteenth Ward ..... Including 2 in Hospitals.

** Nineteenth Ward ..... Including 380 in Hospitals.

†† Twentieth Ward ..... Including 13 in Hospitals.

‡‡ Twenty-first Ward ..... Including 253 in Hospitals.

§§ Twenty-second Ward ..... Including 1 in Hospital.

Abstract of Mortality from Phthisis Pulmonalis—(Continued).

VARIOUS OCCUPATIONS.	NUMBER.	LOCATION BY WARDS.	PUBLIC INSTITUTIONS.	NUMBER OF DEATHS.
Actors	1	5	New York Hospital	1
Actresses	1	6	Centre Street Hospital	1
Artists (including photographers, sculptors, etc.)	13	9	St. Vincent's Hospital	57
Bakers (including confectioners)	27	11	St. Francisus' Hospital	52
Barbers	18	12	Ward's Island Emigrant Depot and Refuge	68
Bookbinders	14	12	Randall's Island Nursery Hospital	1
Brokers	6	12	Bloomingdale Lunatic Asylum	1
Butchers	20	12	House of Refuge	1
Carmen (including coachmen, drivers, etc.)	52	12	House of Good Shepherd	18
Carpenters (including cabinet and piano-makers)	104	12	Colored Orphan Asylum	7
Clerks (including book-keepers, salesmen, etc.)	171	12	Deaf and Dumb Asylum	2
Coopers	10	12	Infants' Hospital, Randall's Island	13
Firemen	2	12	House of Mercy	3
Hatters	9	12	St. Joseph's Asylum	2
Laborers	337	12	Hart's Island Hospital	4
Machinists (including engineers, black and tinsmiths, etc.)	104	12	Sheltering Arms	1
Masons	19	12	Inebriate Asylum	1
Merchants	69	13	Convent "Sacred Heart"	1
Musicians	7	14	Prince Street Roman Catholic Orphan Asylum	2
Painters (including varnishers)	42	19	Lunatic Asylum, Blackwell's Island	20
Pedlers (including hucksters)	21	19	Alms-House, Blackwell's Island	16
Policemen	19	19	Penitentiary, Blackwell's Island	1
Printers (including typesetters)	34	19	Charity Hospital, Blackwell's Island	215
Porters	12	19	Epileptic and Paralytic Hospital, Blackwell's Island	5
Seamen (including boatmen)	30	19	Work-House, Blackwell's Island	2
Seamstresses (including dress and bonnet-makers)	120	19	Fever Hospital, Blackwell's Island	4
Segar-makers	40	19	Colored Home Hospital	50
Servants, female (including cooks and housekeepers)	216	19	Nursery and Child's Hospital	1
Shoemakers	52	19	St. Luke's Hospital	56
Stone-cutters	35	19	German Hospital	25
Tailors	61	19	Roman Catholic Orphan Asylum	4
Teachers, male	2	19	Industrial School	1
" female	18	20	Mount Sinai Hospital	13
Other occupations	425	21	Bellevue Hospital	253
Children and no occupation given	1,989	22	House for Aged and Infirm Women	1
Total	4,030		Total	883

of time, and the atmospheric humidity was about the average. It is probable that a result of the depressing summer weather now appeared in the greater than ordinary mortality among those standing upon the verge of the grave.

With regard to the nativity of those dying from phthisis there are two singular facts which have been developed during the past four years (no accurate statistics of this disease prior to that period being available), viz.: 1st. That in comparing the German and Irish elements we find the proportion of deaths among the Irish very much larger than their excess of population can account for; and 2d, that among the Irish the female decedents preponderate considerably over the males, while among the Germans it is the reverse, the excess of males over females being remarkable, or almost as two to one. We may, perhaps, to some extent explain the latter circumstance by the fact that indoor and sedentary occupations, which are notoriously conducive to the development of consumption, are almost universal among the German male population on the one hand, and on the other the lower classes of German women are more temperate and regular of habit than the corresponding order of Irish. The other fact is easily understood when we consider the infinitely greater poverty and hardships endured by the Irish, and their national traits of improvidence and generosity as compared with the systematic frugality prevailing in almost every German household.

Out of the 4,030 deaths from phthisis but 244 took place in persons of less than 15 years old, being about the ordinary ratio in this city of juvenile mortality from consumption proper. Between 15 and 30 the number of deaths increased progressively, thence gradually diminishing in the succeeding quinquennial periods.

Among the occupations of these decedents, that of "laborer" in men, and of "servant" in women, predominates largely over every other. Clerks and seamstresses come next. The first two include Irish almost exclusively, and the last two principally natives. Carpenters, machinists, and merchants follow. Exactly the same order of fatality characterized the occupations enumerated in the report for 1869. The mortality among tailors, shoemakers, and drivers was large. Painters, cigar-makers, stone-cutters, printers, and seamen were well represented

Public institutions furnished 883, or 22 per cent. of these deaths. Four hundred and sixty-eight died in Bellevue and Charity Hospitals alone, the proportion of such deaths upon the total mortality being in Bellevue at the rate of 23 per cent., and in the Charity Hospital 32 per cent. These, as may be surmised, were cases brought to hospital in the last stages of the complaint, and generally belonging to the most indigent of the population. Out of 708 patients treated at the Lunatic Asylum on Blackwell's Island, phthisis was credited with 20 deaths—over 15 per cent. of the total mortality in the institution. The Colored Orphan Asylum furnished 7, and the Colored Home 50, out of the 111 negroes who died of phthisis in New York, a percentage of 36 upon the total mortality of the latter institution. Throughout the city over 23 per cent. of all negroes dying were victims of phthisis pulmonalis, which illustrates the peculiar susceptibility of the African race to the disease in this climate.

Leaving public institutions out of our calculations, we find that the populous regions of the Eleventh, Seventeenth, Nineteenth, and Twentieth Wards contributed together one-third of the deaths from phthisis. In the various wards we perceive the death-rate from this affection varying greatly, reaching about 19 per cent. in the Fourteenth Ward, 18 in the Twenty-first, 16 in the Fifth, Seventh, and Ninth, while in the Second it is as low as 9 per cent., in the Twenty-second 10, in the Fifteenth 11, and in the Twelfth, Seventeenth, and Nineteenth Wards between 12 and 13. We must be chary, however, of drawing conclusions from these facts. When we consider first the variety of soil and elevation peculiar to each ward in itself, and secondly the nomadic character of the tenement house population, together with the slow progress of the disease, we can appreciate the impossibility of studying the local etiology of phthisis in a great city like New York.

Other Tubercular Affections.

Hydrocephalus and tubercular meningitis were reported as having caused 812 deaths, and marasmus, tabes mesenterica, and scrofula 923. The indefiniteness of these terms (particularly hydrocephalus and marasmus), or at least the different significance attached to them in respect to their tubercular origin, deprives these statistics of any scientific value.

LOCAL DISEASES.

Nine thousand eight hundred and ninety-nine deaths from this important class of diseases were registered during the year, an excess of 516 over the previous year. The chief varieties are enumerated below.

Diseases of the Nervous System.

Diseases of the nervous system caused 3,275 deaths, of which 1,887 were males and 1,388 females, being an excess of 299 over their mortality in the previous year. Convulsions were credited with 1,003 deaths, against 1,000 in 1869—meningitis and encephalitis with 889 against 879, and apoplexy with 391 against 398. The principal source of excess was in the mortality from the effects of heat, only 26 of such cases having been recorded in 1869. It is probable that most if not all of the deaths ascribed to cerebro-spinal meningitis, 32 of which appear in the zymotic class, were the result of simple inflammation, and were not cases of the malignant purpuric or spotted fever to which the former name has been unfortunately applied. We have taken occasion to investigate several deaths returned under that designation and have found all of them as we have stated. We now insist upon physicians discriminating between the two affections in their returns, in order that those which belong to diseases of the nervous system may be properly classified, and that at the same time the Board may at once be informed of the existence of the epidemic and malignant variety should it arise.

Circulatory Diseases.

Seven hundred and eighty-five deaths were occasioned by these causes, of which 421 were males and 364 females—a slight increase over the preceding year. They were principally cases of heart disease and aneurism. We shall endeavor hereafter to make our statistics of heart diseases as definite as the present advanced condition of medical diagnosis will warrant.

Respiratory Diseases.

Three thousand one hundred and sixty-eight lives were destroyed by local affections of the respiratory apparatus—1,731 being males and 1,437 females. This is the first order which we have examined and

found to have given a less mortality for 1870 than for 1869—the decrease amounting to 326. The difference appears chiefly in deaths from pneumonia, which in 1869 amounted to 2,100, and in 1870 to 1,836. Bronchitis, likewise, was less fatal in the past year. We may presume that these results were produced in consequence of the comparatively moderate temperature of the autumn and early winter.

Digestive Diseases.

Digestive diseases caused 1,417 deaths, against 1,123 the previous year. 721 were males and 696 females. Over 200 of this excess was due to enteritis and gastro-enteritis in young children, which complaints, in common with the diarrhœal diseases, increased enormously during the summer, 405 out of 518 deaths having occurred in those less than five years of age. As we have observed before, the majority of such cases belong, in all likelihood, to the zymotic class.

Urinary Diseases.

Urinary diseases were unusually fatal, having produced 1,038 deaths against 771 in 1869. Bright's disease and uræmia carried off 849 alone, and nephritis 103. It were idle to attempt any explanation of this excess. A portion of it might be accounted for by the increase to which we have alluded in the prevalence of intemperance. Twenty-four deaths were due to diabetes mellitus, one to Addison's disease, and two to urethral fever.

Generative Diseases.

There were 76 fatal cases of diseases of the generative system, a large falling off from 1869, when 105 were registered. Only two took place in males, viz., one of gangrene of the penis in an infant, and one of orchitis in an old man. The majority were of metritis and metro-peritonitis (not puerperal), which caused together the deaths of 51 women. Ovarian tumor and ovarian dropsy cut off 13, and "uterine tumor" 7, a vague cause of death which we have not accepted lately.

Locomotory Diseases.

These affections, principally of the long bones and joints, occasioned 91 deaths (53 males and 38 females) against 80 in 1869. Osteo-myelitis, hip disease, and spinal disease were the most prominent.

Integumentary Diseases.

The deaths of 18 males and 30 females were recorded under this head; 29 were fatal cases of abscess upon various external regions of the body. Skin diseases, proper, bore a very unimportant part in producing these deaths, being represented only by boils, rupia, and pemphigus, all of which were in infants.

DEVELOPMENTAL DISEASES.

This interesting class of affections was credited with 1,633 deaths, of which 710 were males and 923 females, an excess in both sexes of 198 over the previous year. Among deaths occurring more particularly in newly-born children, premature birth was mentioned as the cause in 475 instances, and preternatural birth in 32. These were babies whose lives were prolonged but a few minutes, hours, or days. Among others usually premature, but living somewhat longer, cyanosis caused 91, and atelectasis pulmonum 119 deaths.* Spina bifida proved fatal in 12 cases, and other malformations in 44. Males were in excess by about 30 per cent.

Among the developmental diseases peculiar to women (amounting to 169), the various affections incident to parturition were the most fatal. Puerperal fever, which caused 63 deaths, is excepted from these cases, being purely a zymotic disease. There were 87 deaths from puerperal metritis, 46 from puerperal convulsions, and 40 from flooding. Childbirth was the only cause assigned in 23 instances. But seven deaths were reported from miscarriage or abortion. The facility with which criminal cases of this nature may be cloaked over renders it certain

* A large number of these deaths from premature birth and atelectasis took place at the Foundling Hospital. Language is not capable of describing the miserable aspect of the poor little waifs there consigned to the tender ministrations of those noble women so aptly named "Sisters of Charity." Many of their feeble charges arrive half dead and gasp their last breath within a few hours. Others languish for a while longer and fall an easy prey to convulsions or bronchial and intestinal affections. The most consummate medical skill is inadequate to save them. The care lavished upon them avails only to postpone for a brief period their predestined end.

By referring to the report of the Foundling Asylum on page 279, the reader will find figures to corroborate our statement. 600 babies, out of 1,399 received during the year, were left at the institution "in a sickly or dying condition from premature exposure to cold, sickness, or prematurity."

that the vast majority of them are returned under titles very foreign to their character.

OLD AGE.

This was the only cause of death assigned in 318 cases, of which 218 were females. The ages ranged from 60 upwards. Nine were reported to have been 100 years old or more—seven being Irish, one a Virginian, and one a Prussian. The ages of most of these examples, however, of abnormal longevity are more traditional than authentic. Thirty-seven of the above are included in the annexed table of persons dying at the age of 90 and upwards. There were 65 of these more than octogenarians—28 males and 37 females—whose sands of life ran out during the past year. Paralysis and apoplexy cut off only three out of the whole number, affections of the lungs being the most marked and definite causes of death.

Within five years there have been recorded in New York 284 deaths of persons 90 years old and upwards, of whom 88 were males and 196 females. One hundred and ninety-two (67 per cent.) were of foreign birth (principally Irish) and 92 natives. In only 67 cases were their former occupations given, of which there were 21 laborers among the men and 18 domestics among the women, 6 merchants, 4 farmers, and 4 shoemakers. November, May, March, and December were, in the order mentioned, the most fatal for these people—42 per cent. having perished in those four months; and June, July, and August the most propitious, but 20 per cent. having died within those months.

DISEASES OF NUTRITION.

Atrophy and asthenia were assigned as causes of death in 295 instances. Most of these (viz., 209) were in infants less than one year old, and included many cases whose counterparts are to be found under the head of marasmus.

DEATHS BY VIOLENCE.

A very interesting table of classified causes of death by violence is appended. We were desirous of rendering it complete in respect to cases where the nature of the accident producing death was not specified upon the coroner's certificate (being developed subsequently at the inquest), but our efforts to obtain from the late Board of Coroners

Deaths of Persons 90 Years Old and Upwards During the Year 1870.

	NAMES.	AGE.			NATIVITY.	OCCUPATION.	COLOR.	DATE OF DEATH.	REMARKS.		CAUSE OF DEATHS.
		Years.	Months.	Days.					Yrs. in U. S.	Condition.	
1	Ann Conroy	90	....	....	Ireland	Housekeeper	White	March 4	26 years	Widow	Bronchitis.
2	Cornelius Callahan	90	....	....	Ireland	.....	White	May 5	19 years	Widower	Old Age.
3	Ellen Duane	90	....	....	Ireland	.....	White	May 26	22 years	Widow	Old Age.
4	Mary A. Gardner	90	....	4	New York	Washing	White	March 1	Lifetime	Single	Phthisis Pulmonalis.
5	Elizabeth Gallo	90	....	....	France	.....	White	April 5	9 years	Widow	Apoplexy.
6	Abigal C. Harris	90	4	....	New York	.....	White	May 16	Lifetime	Widow	Old Age (Ossification of Heart).
7	William Kerwin	90	....	....	Ireland	Farmer	White	January 5	10 years	Widower	Old Age (Debility).
8	Burgoyne Kenderbeck	90	....	....	France	Turner	White	April 27	18 years	.....	Pleuritis (Obstruction of Gall Duct).
9	Martha Leland	90	....	....	Massachusetts	.....	White	April 29	Lifetime	Widower	Pneumonia.
10	Bridget Cary	90	....	....	Ireland	.....	White	August 9	19 years	.....	Bronchitis.
11	Margaret Gardner	90	7	....	New York	.....	White	August 16	Lifetime	Widow	Old Age.
12	Mary Michaels	90	....	....	Ireland	.....	White	September 29	55 years	Widow	Cancer of the Breast.
13	Edward Murray	90	....	....	Ireland	Shoemaker	White	September 30	31 years	Widower	Pneumonia (Bronchitis).
14	Patrick Kervin	90	....	....	Ireland	Laborer	White	October 25	32 years	.....	Senile Gangrene (of foot).
15	Elizabeth Porter	90	....	....	Ireland	.....	White	November 1	.....	Widow	Old Age.
16	Cornelius McLaughlin	90	....	....	Ireland	Laborer	White	November 1	22 years	Married	Bright's Disease (Pneumonia).
17	Robert Sailor	90	....	....	New York	.....	Black	November 14	Lifetime	Widower	Pneumonia.
18	James Doherty	90	....	....	Ireland	.....	White	December 17	18 years	Widower	Old Age.
19	Patrick Horan	91	....	....	Ireland	.....	White	January 13	12 years	Widower	Old Age.
20	Henry Randolph	91	....	....	New Jersey	.....	Black	February 18	Lifetime	Widower	Old Age.
21	Maria Stock	91	6	....	Germany	.....	White	June 9	19 years	Widow	Old Age.
22	Sarah A. Turner	91	....	....	Virginia	.....	White	February 9	Lifetime	Widow	Old Age (Bronchitis).
23	Barns Underhill	91	....	19	New York	.....	White	May 3	Lifetime	Widower	Gastritis (Age).
24	Sarah Wooley	91	4	10	New York	.....	White	June 26	Lifetime	Single	Old Age.
25	Ann Kumbel	91	....	....	New York	.....	White	December 1	Lifetime	Single	Bronchitis.
26	Anna Fayard	92	....	....	New York	.....	White	May 6	Lifetime	Widow	Old Age.
27	Emanuel Levey	92	....	....	England	.....	White	July 19	5 years	Widower	Direct effect of heat.
28	Bridget Murray	92	....	....	Ireland	.....	White	August 20	20 years	Widow	Old Age.
29	Louise Brouillet	92	....	25	Canada	.....	White	September 26	2 years	Widow	Old Age.
30	Ann McCue	92	....	....	Ireland	.....	White	September 28	18 years	Widow	Old Age.
31	Mary Halhanon	92	....	....	Ireland	.....	White	November 5	18 years	Widow	Old Age.
32	Lawrence Kelly	92	....	....	Ireland	Gardener	White	November 23	27 years	.....	Bright's Disease (Phthisis Pul.).
33	Mary Webb	92	....	....	New York	.....	White	December 19	Lifetime	Widow	Old Age.
34	Andrew Caffney	93	....	....	England	Mason	White	May 4	67 years	.....	Pneumonia.
35	Niclas Segrist	93	11	20	Germany	Merchant	White	January 16	22 years	Married	Gastritis (Uræmia).

36	Edward Lynch	93	....	....	Ireland	Laborer	White	November 6	33 years	Widower	Cerebral Apoplexy.
37	Bernard Corrigan	94	6	10	Ireland	Farmer	White	February 7	9 years	Married	Old Age.
38	Ellen Cox	94	....	....	Ireland		White	May 6	50 years	Widow	Old Age (Bronchitis).
39	Bryan Garvey	94	....	....	Ireland		White	June 30	34 years	Widower	Old Age.
40	Michael McDermott	94	....	....	Ireland	Laborer	White	March 8	21 years	Married	Bright's Disease.
41	Nancy McCormick	94	....	....	Ireland	Housekeeper	White	September 7	5 years	Widow	Dysentery.
42	Mathew Tulley	94	8	....	Ireland	Laborer	White	September 23	18 years	Married	Old Age.
43	Margareta Seissel	94	6	....	Germany		White	November 27	16 years	Widow	Old Age.
44	Mary Calnan	95	....	....	Ireland		White	April 9	40 years	Widow	Old Age.
45	Cyrus Reynolds	95	....	....	Maryland	Laborer	White	June 6	Lifetime	Widower	Paralysis.
46	Ann Farley	95	....	....	Ireland		White	October 15	30 years	Widow	Old Age.
47	Abraham Herter	95	7	14	New Jersey		White	October 9	Lifetime	Widower	Bronchitis.
48	Catherine Connor	96	....	....	Ireland		White	January 21	7 years	Widow	Old Age (Fracture of Neck of Femur).
49	Philip H. Schmidt	96	....	....	Germany		White	October 29	26 years	Single	Old Age.
50	Jeremiah Murphy	96	....	....	Ireland		White	November 1	46 years	Married	Phthisis Pulmonalis.
51	Patrick O'Brien	96	....	....	Ireland	Laborer	White	December 8	4 years	Widower	Old Age.
52	Mary Dunn	97	....	....	Ireland	Domestic	White	September 22	23 years	Widow	Meningitis.
53	Naphthali Philips	97	....	11	New York		White	November 1	Lifetime	Married	Cancer of Face.
54	Ann Webb	97	1	....	Connecticut		White	November 30	Lifetime	Widow	Old Age (Asthenia).
55	Cristeller Meyer	98	....	....	Poland	Merchant	White	August 23	40 years	Widower	Pleuritis (Hydrothorax).
56	William Barry	99	....	....	Ireland	Laborer	White	December 19	23 years	Married	Phthisis Pulmonalis.
57	Sarah Conway	100	....	....	Ireland		White	May 5	24 years	Widow	Old Age.
58	Sophia Williams	100	....	....	Virginia		White	April 10	Lifetime		Old Age.
59	Johannah Sullivan	100	10	....	Ireland		White	November 10	40 years	Widow	Old Age.
60	Lipman Kristeller	100	1	7	Prussia	Sh'rt Manf'r	White	November 19	25 years	Married	Bright's Disease (Old Age).
61	Mary Myers	100	....	....	Ireland		White	December 18		Widow	Old Age.
62	Daniel Collins	101	3	....	Ireland	Laborer	White	November 30	26 years	Widower	Old Age (Asthenia).
63	Anne Ryan	102	....	....	Ireland		White	January 3	50 years	Widow	Old Age.
64	Kate Eagan	102	....	....	Ireland		White	September 11	17 years	Widow	Old Age.
65	Henry O'Flaherty	103	....	....	Ireland	Tailor	White	April 11	23 years	Married	Old Age.

a compliance with Section 148 of the Sanitary Code met with no success. A portion of said section reads thus:

"It shall be the duty of all Coroners in said city to make return to the Bureau of Records of Vital Statistics of all inquisitions by them taken, except when, by law, such inquests are required to be filed elsewhere; and such return shall include the evidence taken on such inquest, and the verdict of the jury, and the full names and residences of the several jurymen.

"And in all cases where the inquest may be required by law to be filed elsewhere, such Coroner shall make return to said Bureau of a copy of such inquest, including a copy of such evidence and verdict; and all such returns shall be made within forty-eight hours after the holding of any and every inquest."

It has heretofore been customary for coroners to return their inquisitions to this Bureau in from three to six months, instead of forty-eight hours, as required by the Code. No proper classification of such statistics will ever be practicable if this irregularity continue.

Out of 2,601 coroners' certificates received within the year, 1,000 referred to violent deaths, of which 786 were males and 214 females. Fractures and contusions by various accidents—being caught in machinery, fall of buildings, explosion of blasts, and others too numerous to detail here—produced 134 deaths. 45 persons were killed by street cars, 26 by steam cars, and 18 by other vehicles. 62 were burned to death; 18 by inflammable and explosive illuminating fluids—kerosene, gasoline, benzine, liquid gas, etc. It is probable that many more such cases were included among those certified "clothes taking fire" or those classified "means not specified." The greater portion of these victims were females. Accidental scalds, usually of young children during the domestic occupation of their mothers, caused 53 deaths. 214 persons were killed by falling from windows, stairs, roofs, buildings, through hatchways, from vehicles, and, in fact, from almost every conceivable object which man can climb or mount. 14 persons were accidentally poisoned, and 56 (mostly infants) accidentally suffocated. 25 of the latter were "overlaid in bed." 175 persons were supposed to have been accidentally drowned, their bodies being usually found after a considerable lapse of time after death and unrecognizable from decomposition. How many of these cases were murders it is of course impossible to estimate, but doubtless very many, the majority being probably suicides. One person was instantly killed by a stroke of lightning.

Toward the close of the year a number of deaths in succession re-

sulted from hemorrhage following the operation of circumcision upon Jewish infants. Our investigation of the causes leading to these unfortunate results developed the existence of a class of ignorant and unskilful itinerant operators who made a business of going about among the poorer Jews and circumcising their infants for a small consideration, leaving them afterwards to be taken care of by their parents. As this was a matter involving some religious relations, and therefore a delicate one for official interference, we simply represented the facts to several influential Jewish gentlemen, both clerical and medical, and received assurances of their co-operation in suppressing this objectionable practice.

Classification of Deaths from Sudden and Violent Causes, Registered in the City of New York, during Twelve Months, ending December 31, 1870.

ACCIDENTS AND NEGLIGENCE.

Fractures and contusions (means not specified)	42
By machinery	14
By fall of rock	2
" stone	1
" wall	3
" window	1
" wheel	1
" grating	1
" derrick	4
" box through hatchway	1
" block of wood	1
" pole	1
" bricks	2
" lumber	2
By fall from mother at birth	1
By fall of trestle-work	1
" tree	1
" mortar cornice	1
By falling in of building	11
By caving in of oven	1
By a blast	4
By a leap	2
By nitro-glycerine	1
By a flying piece of grind-stone	1
By injuries from a hot iron	1
By collision of vehicles	1
By blows	1
Thrown from wagon	2
By splinter in foot	1
Caught by pulley	1
Struck by a train of cars	1
By explosion of soda-water fountain	1
By kick of a horse	3
Crushed (not specified)	2
" by slab of marble	1
" between vessel and dock	3
Crushed by ferry-boat	1
" by railroad cars	1
" by elevator	3
" by embankment	7
" by float	1
" by boiler	1
" between cart and tree	1
" by barrel of apples	1
Total	154

BY RAILROAD CARS AND OTHER VEHICLES.

By street railroad cars	45
By steam railroad cars	26
By other vehicles	18
Total	89

ACCIDENTAL BURNS.

Burns (means not specified)	14
" by clothes taking fire	22
" by explosion	1
" by explosion of gasoline	3
" by kerosene oil	12
" by molten brass	1
" by liquid gas	1
" by fall into lime kiln	1
" at a fire	1
" by hot iron	1
" by fireworks	1
" by explosion of alcohol lamp	1
" by a sulphur match	1
" by a blast	1
" by benzine	1
Total	62

ACCIDENTAL WOUNDS.

(a) Incised	1
(b) Gunshot	14
(c) Penetrating	1
Total	16

ACCIDENTAL SCALDS.

Scalds (means not specified)	9
" by hot soup	1
" by hot water	26
" by hot tea	3
" by hot coffee	6
" by hot milk	4
" by melted sugar	1
" by boiler explosion	1
Total	53

ACCIDENTAL FALLS.

Falls from (not specified)	19
" from roof	13
" through sky-light	1
" from windows	33
" from steps	2
" from stairs	27
" from building	10
" from stoop	1
" from balcony	2
" from fire-escape	5
" from balustrade	1
" from stair-well	1
" from shed	1
" down cellar steps	5
" into area	3
" from scaffolding	11
" from ladder	8
" through hatchway	18
" against a stove	1
" on shipboard	2
" into ship hold	1
" through ship hatchway	2
" from ship mast	2
" from a sloop	1
" from a wagon	11
" while intoxicated	1
" in streets	11
" from rock	1
" from embankment	1
" from car	5
" from truck	4
" from bridge	1
" through hole in dock	1
" from horse	1
" from pile of lumber	3
" from chair	1
" from bed	1
" from tree	2
Total	214

ACCIDENTAL POISONING.

By inhaling chloroform	1
By carbolic acid	1
By morphine	2
By opium	2
By arsenite of copper	1
By inhaling gas	1
By vaccine virus	1
By spirits of turpentine	1
By aqua ammonia	1
By tincture of aconite	1
By whiskey	1
By wound of finger	1
Total	14

ACCIDENTAL SUFFOCATION.

By (means not stated)	13
Overlaid in bed	25
At birth	1
At mother's breast	1
At fire	5
By falling into manger of hay	1
By effects of inhaling steam	1
During operation for tonsillitis	1
By food	4
Found in privy	2
Fell into privy	2
Total	56

ACCIDENTAL DROWNING.

Supposed accidental drowning	173
Drowned in a vat	3
" while bathing	2
" while rescuing	1
Effects of immersion in water	5
Total	186

SUICIDE.

By drowning	11
By hanging	27
By cut, stab	9
By gunshot	21
By jumping from height	7
Poison, by opium	1
" paris green	10
" laudanum	6
" corrosive	1
" morphine	2
" sulphuric acid	1
" strychnine	3
" nicotine	1
By placing himself in front of a locomotive	1
Total	101

HOMICIDE.	
By blows	7
By cut, stab	15
By gunshot	19
By suffocation	4
By (means used not specified by Coroners)	6
Total	45

JUDICIAL EXECUTIONS.	
John Reynolds	1
John Real	1
Total	2

MISCELLANEOUS.	
From diseases certified by Coroners	1,891
Struck by lightning	1
Found in streets	1
Decomposed when found	1
Surgical operations	1
Unknown causes	11
Old human remains (not buried)	1

RECAPITULATION.	
Accidents and negligence	24
Homicides	45
Suicides	101
Miscellaneous	22
Judicial executions	2
Diseases certified by Coroners	1,891
Total violence	1,90
Total disease	1,8[illegible]

During 1870 there were 45 murders committed—almost one weekly—and there were two judicial executions, viz., of John Reynolds and of John Real.

Suicide.

Suicide was a very common cause of death, 101 persons (two per week) having taken their own lives. Of these 79 were males and 22 females. Twenty-seven hung themselves, 21 shot themselves, 11 drowned themselves, nine cut or stabbed themselves, and seven jumped from heights. Twenty-five poisoned themselves, the favorite article being Paris green, of which 10 partook. One sought destruction by placing himself in front of a locomotive.

The following facts appear in the table of suicidal deaths: Persons of German birth would seem most prone to commit suicide, that nationality having furnished 46, or nearly one-half the cases. Hanging appears to be preferred by the Germans, 17 having resorted to that method. Eleven shot themselves; seven poisoned themselves—generally employing violent and active drugs, as Paris green, strychnine, and sulphuric acid; three leaped from windows, three cut their throats, one stabbed himself, and one killed himself with a hatchet; three drowned themselves. None selected means known to be unattended with pain.

The Americans and Irish come next, with 16 cases each. Six of the former chose narcotic poison, and five death by shooting; two took Paris green, two cut their throats, and one hung himself. Of the Irish, six poisoned themselves, four hung themselves, two shot themselves, two leaped from windows, one drowned himself, and one cut his throat.

Four out of the seven English took poison, one hung himself, one leaped from a roof, and one committed suicide by drowning.

Of the three French, there was one death by hanging, one by cutting his throat, and one by leaping from a roof.

As regards occupations, clerks of various kinds head the list with 13 deaths; six being Americans, six Germans, and one Irish. Most of these were young men, one being only fifteen years of age. There were six deaths of carpenters and cabinetmakers, all Germans; and four of tailors and shoemakers, all Germans likewise. Four merchants killed themselves—two Germans, one Irish, and one American—all men advanced in years. Two druggists, one Irish and one American, finished their career by taking morphine. Of three laborers, two Irish and one German, two hung themselves and one took poison. One German teacher and one American speculator employed the pistol. One English actor and two German gardeners drowned themselves.

SUICIDAL DEATHS,

Classified by Dates, Ages, Condition, Occupations, Nativities, and Means Used, Twelve Months ending December 31, 1870.

MONTH.	DATE.	AGE.	CONDITION.	OCCUPATION.	NATIVITY.	MEANS USED.
1870.		Years.				
January	2	33	M.	Teacher	Germany	Gunshot
"	4	41	"		"	Hanging
"	4	38	"	Carman	Canada	"
"	4	28		Clerk	New York	Cutting throat
"	5	28	S.	Cabinetmaker	Germany	Hanging
"	12	32	M.		"	"
"	21	42	S.	Bartender	Ireland	Cutting throat
"	22	27	M.		Germany	With a hatchet
"	24	51	"	Speculator	New York	Gunshot
"	27	50	"	Sailmaker	Norway	Hanging
"	29	61	S.	Messenger	France	Cutting throat
February	4	45			England	Hanging
"	7	24	S.	Tailor	Germany	"
"	10	60	"	Carrier	"	"
"	15	66	M.	Cabinetmaker	"	Gunshot
"	17	75	W.		New York	Paris green
"	24	73	"		Ireland	Leap from window
March	3	68			"	Drowning
"	5	46	M.		England	Opium
"	8	24	"		"	Laudanum
"	10	50	W.	Laborer	Ireland	Corrosive poison
"	21	23	S.	Waiter	Germany	Hanging
"	24	28	M.	Butcher	"	Gunshot
April	7	46	"		Ireland	Paris green
"	8	35	S.	Cabinetmaker	Germany	Hanging
"	9	27	M.		"	Leap from window
"	13	35			Unknown	Gunshot
"	14	28	S.	Druggist	Maryland	Morphine
"	19	47	M.	Bookbinder	New York	Gunshot
"	21	47	"	Shoemaker	Germany	Hanging
May	5	47	"	Brewer	"	Leap from window
"	6	46	W.		England	" roof

MONTH.	DATE.	AGE.	SEX.	OCCUPATION.	NATIVITY.	MEANS USED.
1870.		Years.				
May	21	26	M.	Gardener	Germany	Drowning
"	22	42	"	Mending	"	Hanging
"	24	27	"		New Jersey	Paris green
"	29	29	"	Carriagemaker	Germany	Sulphuric acid
June	1	60	W.		Ireland	Hanging
"	4	24	S.		New York	Gunshot
"	4	27	"	Peddler	Poland	By locomotive engine
"	11	42	W.	Tinto-keeper	Switzerland	Gunshot
"	19	60	M.	Weaver	Germany	Hanging
"	20	21			France	"
"	24	60			Unknown	Drowning
"	24	60			"	"
"	25	42	S.	Clerk	Germany	Cutting throat
July	3	55	M.	Painter	"	Hanging
"	6	25	W.		"	Cutting throat
"	7		M.	Actor	England	Drowning
"	12	24	"		"	Strychnine
"	18	22	"		"	Paris green
"	20	57	W.	Tailor	Germany	Hanging
"	20	23	S.	Seamstress	Ireland	Strychnine
August	1	44	M.	Produce merchant	"	Gunshot
"	1	25			Unknown	Drowning
"	3	40	M.	Merchant	Germany	Stab-wounds
"	7	65	S.		Unknown	Drowning
"	8	29	W.	Domestic	Ireland	Paris green
"	8	45	"		"	Hanging
"	9	56	M.	Merchant	New York	Laudanum
"	9	37	"	Saloon-keeper	Germany	Hanging
"	14	42	"	Bookkeeper	"	Shooting
"	16	50			Unknown	Drowning
"	21	21			"	"
"	21	42	W.	Pocket-books	Germany	Strychnine
"	22	40	M.	Jeweller	"	Gunshot
"	22	64	W.	Gardener	"	Drowning
"	31	23	S.	Clerk	New York	Laudanum
September	1	27	"	Laborer	Ireland	Hanging
"	1	23	"	Clerk	Germany	"
"	4	28	M.	Baker	Ireland	"
"	5	25			Unknown	"
"	10	37	M.	Trunkmaker	New Jersey	"
"	11	40			Germany	"
"	12	50	M.		Ireland	Paris green
"	16	52	"	Shoemaker	Germany	Hanging
"	21	25	"	Cabinetmaker	"	Paris green
"	23	25	S.		France	Leap from roof
"	27	51	M.		Germany	Paris green
October	6	37	S.	Importer	"	Gunshot
"	15	42	M.	Laborer	"	Hanging
"	16	20	"		Ireland	Leap from window
"	21	61			Germany	Gunshot
"	21	23	S.	Carpenter	"	"
"	24	20	"	Clerk	Ireland	"
"	24	25	"	"	New Jersey	Cutting throat
November	1	37	"	Bookkeeper	Maine	Gunshot
"	3	42	M.	Sugar manufacturer	Germany	"
"	6	15	S.	Clerk	New York	Laudanum
"	7	20	"	"	Germany	Paris green
"	10	25	M.	Carman	New York	Laudanum
"	15	20	"		New Jersey	"
"	18	28	"	Druggist	Ireland	Morphine
"	22	21	S.	Clerk	Germany	Cutting throat
"	24	20	M.	Pocket-books	"	Gunshot
December	2	55	"	Salesman	New York	"
"	4	25	W.	Carriagemaker	Germany	"
"	6	27	M.	Cardriver	"	Drowning
"	6	27	"		"	Paris green
"	10	39	"	Watchman	Sweden	Gunshot
"	14	28	S.	Clerk	Germany	Leap from window
"	27	39	M.	Carpenter	"	Gunshot

CAUSES CLASSIFIED.		NATIVITIES.	
By drowning	11	Canada	1
" hanging	37	England	7
" cut—stab	9	France	3
" gunshot	21	Germany	46
" leap from height	7	Ireland	16
" opium	1	Norway	1
" Paris green	10	Poland	1
" laudanum	6	Sweden	1
" corrosive	1	Switzerland	1
" morphine	2	United States	16
" sulphuric acid	1	Unknown	8
" strychnine	3	Total	101
" nicotine	1		
" placing himself before a locomotive	1	SEXES.	
Total	101	Males	79
		Females	22

Mortality in Tenement Houses.

The whole number of tenement houses in the city of New York, in which deaths occurred during the year 1870, was eight thousand five hundred and nine.

The whole number of deaths in these tenement houses, thirteen thousand and fifty-two.

Distributed as follows:

1 death in	5,708	houses	.....	Deaths	....	5,708
2 deaths in	1,769	"	.....	"	....	3,538
3 " "	606	"	.....	"	....	1,818
4 " "	261	"	.....	"	....	1,044
5 " "	91	"	.....	"	....	455
6 " "	42	"	.....	"	....	252
7 " "	25	"	.....	"	....	175
8 " "	5	"	.....	"	...	40
11 " "	2	"	.....	"	....	22
	8,509					13,052

Notwithstanding the excessive death-rate in this city during the past year, the mortality in tenement houses evinced a decided improvement over that of previous years. This amelioration has been progressive in the past three years among that class of our inhabitants which, although

Mortality in Tenement Houses, Public Institutions, and Private Dwellings within the past three Years.

MORTALITY.	1868.				1869.				1870.			
	First District.*	Second District.*	Third District.*	Total.	First District.	Second District.	Third District.	Total.	First District.	Second District.	Third District.	Total.
In tenement houses	3,645	5,833	5,082	14,550	3,359	5,192	4,734	13,285	3,017	5,500	4,535	13,052
In public institutions	338	91	3,885	4,314	311	90	3,664	4,065	758	111	4,081	4,945
In private dwellings	1,778	986	3,261	6,025	2,370	1,499	3,948	7,817	2,426	1,632	5,120	9,178
Total mortality	5,761	6,900	12,228	24,889	6,040	6,781	12,346	25,167	6,196	7,243	13,736	27,175
Percentage of deaths in tenement houses	63.27	84.39	41.56	58.46	55.61	76.57	38.34	52.79	48.69	75.93	33.01	48.02
Percentage of deaths in public institutions	5.86	1.32	31.77	17.33	5.14	1.32	29.68	16.15	12.10	1.53	29.71	18.18
Percentage of deaths in private dwellings	30.86	14.29	26.67	24.21	39.25	22.11	31.98	31.06	39.13	22.53	37.27	33.77
Percentage of deaths in tenement houses and public institutions on total mortality	69.14	85.71	73 33	75.79	60.76	77.89	68.02	68.94	60.84	77.46	62.79	66.22
Percentage of deaths in tenement houses and public institutions on total population	2.13	2.53	2.90	2.60	1.96	2.26	2.75	2.39	1.72	2.00	1.98	1.90
Percentage of total mortality on total population	3.08	2.96	4.00	3.43	3.29	2.91	4.04	3.46	2.84	2.59	3.08	2.88

* The First District comprises the First, Second, Third, Fourth, Fifth, Sixth, Eighth, Ninth, Fourteenth, and Fifteenth Wards; the Second District comprises the Seventh, Tenth, Eleventh, Thirteenth, and Seventeenth Wards; and the Third District comprises the Twelfth, Sixteenth, Eighteenth, Nineteenth, Twentieth, Twenty-first, and Twenty-second Wards.

numbering less than half of the whole population, furnished in 1868 nearly 76 per cent. of the total mortality, a proportion which has been reduced at the present time to about 66 per cent. These figures require but little comment, illustrating as they do so forcibly results which can be attributed solely to sanitary reform accruing from the efforts of the Metropolitan Board of Health and its successor the Health Department. It is, perhaps, impracticable by any legal enactments to obviate the domestic herding together of immense masses of people in certain portions of this city; and diseases of a special character must necessarily be rife amid this overflowing population. But that many of the evils which have seemed inherent in such circumstances are not inevitable, but may be prevented, abolished, or mitigated by intelligent and persistent sanitary measures, is a fact which our experience has gradually and surely developed.

In 1868 nine thousand six hundred and two tenement houses contributed 14,550 deaths, and the charitable institutions of the city (most of whose patients come from these dwellings) 4,314 more, being together 75.79 per cent. of the total mortality. In 1869 thirteen thousand two hundred and eighty-five deaths took place in 8,853 tenement houses, and 4,065 in hospitals, being together 68.94 per cent. of the total mortality. In 1870 eight thousand five hundred and nine tenement houses furnished 13,052 deaths, which, in conjunction with 4,945 more in the public institutions, amounted to 66.22 per cent. of the total mortality. We thus discover a gain of 9½ per cent. within three years—or, in other words, a saving of 2,600 lives, which would inevitably have been sacrificed had they been exposed to former local insalubrious surroundings as well as to the unfavorable natural conditions of the year.

We find as regards the mortality in tenement houses, that a much greater relative improvement has been manifiested in the First District (comprising the First, Second, Third, Fourth, Fifth, Sixth, Eighth, Ninth, Fourteenth, and Fifteenth Wards) than in either of the other two. In 1868, 63.27 per cent. of the total mortality of this district occurred in tenement houses proper, and in 1870 only 48.69 per cent., a gain of 14.58 per cent. In the Second District (comprising the Seventh, Tenth, Eleventh, Thirteenth, and Seventeenth Wards) the gain was equivalent to 8.46 per cent., and in the Third Dis-

trict (comprising the Twelfth, Sixteenth, Eighteenth, Nineteenth, Twentieth, Twenty-first, and Twenty-second Wards) to 8.55 per cent. The First District, although including some of the most crowded and miserable quarters of the town, has but 44 per cent. of its population residing in tenement houses, while the Second District has 64 per cent., and the Third District 37 per cent. Much of the population of the First and Second Districts has of late years removed into the Third District, and the First, being much less overcrowded than the Second, has improved proportionately in its tenement-house mortality. The total population of these districts is now 218,119 in the First, with an area of 2.28 square miles; 279,236 in the Second, with an area of 1.47 square miles; and 444,897 in the Third, with an occupied area of 13 square miles.

The fact that the number of tenement houses in which deaths occurred diminished from 9,602 in 1863 to 8,512 in 1870, might create the impression that a larger proportion of such dwellings had latterly escaped the visitation of death than has actually been the case. Although a very natural conclusion, it is open to doubt, as the following statement shows.

A sanitary inspection by officers of the Metropolitan Board of Health during the winter of 1866–7, disclosed a total of 18,582 tenement houses in New York. At that time there was no legal definition of the term "tenement house," except what was contained in Sec. 128 of the Code of Health Ordinances adopted by the Board on the 20th day of April, 1866, and reading as follows: "That the phrase 'tenement house' shall be held to include every building, public or private (and every story and portion thereof), which is rented, leased, let, or hired out to be occupied for any period (certain or uncertain) as the residence, home, or house of any person, or is intended so to be."

This clause afforded a wide margin to the discrimination of each inspector in selecting for examination what he might regard as a tenement house, so that some houses occupied by two large families, and the majority of those containing three families, were probably included in that inspection, as had previously been done in 1864 by Inspectors of the Council of Hygiene.

The Tenement-house Law, enacted by the Legislature on May 14, 1867, limited the term "tenement house" to residences containing *more*

Table showing Population, Number of Tenement Houses, Area, etc., in the Several Wards of New York City.

WARDS.	Population (Census of 1870).	Number of Tenement Houses (Sanitary Survey of 1869).	Population of Tenement Houses according to Survey.	Percentage of Total Population in Tenement Houses.	Average Population of Tenement Houses.	AREA. No. of Acres.	AREA. Square Miles.	Rate of Population to the Square Mile.	No. of Square Yards to each Person.
First	14,463	198	8,383	57.79	42.34	154	0.24	60,262	51.5
Second	1,312	5	118	8.99	23.60	81	0.12	10,933	298.8
Third	3,715	30	918	24.71	30.60	95	0.15	24,766	123.7
Fourth	23,787	352	12,221	51.39	34.71	83	0.13	182,977	16.8
Fifth	17,152	318	9,449	55.08	29.71	168	0.26	65,969	47.4
Sixth	21,153	470	17,128	80.97	36.44	86	0.13	162,715	19.6
Seventh	44,819	659	22,415	50.01	34.01	198	0.31	144,577	21.3
Eighth	34,913	621	14,933	42.77	24.04	183	0.29	120,389	25.3
Ninth	47,607	576	15,256	32.04	26.48	322	0.50	95,214	32.7
Tenth	41,411	617	23,023	55.59	37.31	110	0.17	243,594	12.8
Eleventh	64,230	1,757	56,911	88.60	32.39	196	0.30	214,100	14.7
Twelfth	47,496	167	3,720	7.83	22.46	*3,480	*5.44	*8,731	354.6
Thirteenth	33,365	536	18,134	54.35	33.83	107	0.17	196,264	15.5
Fourteenth	26,431	632	19,106	72.28	30.23	96	0.15	176,206	17.6
Fifteenth	27,586	181	4,545	16.47	25.11	198	0.31	88,987	34.7
Sixteenth	48,360	653	18,542	38.34	28.33	384	0.60	80,600	38.4
Seventeenth	95,411	1,901	72,344	75.82	38.05	331	0.52	183,483	16.7
Eighteenth	59,598	867	33,210	55.72	38.30	593	0.93	64,084	48.1
Nineteenth	86,055	1,017	28,230	32.80	27.75	1,530	2.39	36,006	85.0
Twentieth	75,318	1,554	40,706	54.04	26.19	435	0.68	110,761	27.9
Twenty-first	56,709	757	22,845	40.28	30.17	472	0.74	76,633	40.2
Twenty-second	71,362	1,004	26,355	36.93	26.25	1,420	2.22	32,145	96.3
Total	942,252	14,872	468,492	49.72	31.50	10,722	16.75	56,254	55.0
Portion of Twelfth Ward, north of One Hundred and Forty-fifth street						1,980	3.09	Rate of Population to the Square Mile, including all unbuilt up portions.	Square Yards of area to each inhabitant (estimated upon the entire area of the city).
Area of Parks included throughout entire city						1,800	2.81		
Total area of City, with its Parks, Streets, and unbuilt portions						14,502	22.65	41,600	74.4

* The irregular tongue of Manhattan Island, north of One Hundred and Forty-fifth street, remains comparatively unpopulated. Its area—1,980 acres—gives to the Twelfth Ward a total of 8½ square miles. The pro-rata of population upon total area of the Ward would be 5,587 to the square mile, or 556 square yards to each inhabitant.

than three families, living independently and cooking upon the premises, or more than two families upon a floor so living and cooking, with common privileges in the halls, yards, etc. No very essential change as regards the number of families in such dwellings followed the enforcement of the Tenement-house Act for some time; but during 1869, they were so completely and thoroughly inspected, complained of, and remodelled, that a revolution occurred not only in their hygienic structural arrangements, but also in the peculiar distribution of their inmates. Many landlords, in order to evade the requirements of the law so rigidly exacted, altered the disposition of their apartments in such manner that technically their houses ceased to be tenement houses. Dwellings formerly including four, five, or six domiciles were now restricted to only three, and new colossal tenement houses were erected or old ones reconstructed in order to accommodate the surplus people.

The sanitary survey of tenement houses in 1869 was confined exclusively to those defined as such in the law; and hence the disparity between its figure (14,872) and that of 1867 (18,582). The changes which we have described probably reduced the actual number of tenement houses between 1867 and 1870, although their population was simply shifted from one class of such houses to another.

The accompanying table presents the chief features of interest in connection with our tenement-house population.

The abstract that follows is very instructive. It is simply one corresponding with that which appeared in the annual report for 1869, but having also indicated those individual tenements which were alike conspicuous for excessive mortality in both of the two past years. 9 houses in Baxter street, 9 in Cherry street, 11 in Mott street, 11 in Washington street, and 12 in Mulberry street, are thus significantly excepted from all the rest. Among them persons familiar with the localities will recognize many a familiar haunt of disease and death.

An idea has been lately suggested, whose execution would exercise a salutary effect upon the distribution of our tenement-house population. Within the last few years a revolution in property has been occasioned in the extreme lower portion of the city, particularly in the First Ward, by the northward migration of trade. Buildings and warehouses which formerly commanded enormous rents have thus become comparatively valueless. Hence an opportunity is presented to capitalists of making

Abstract showing the distribution of Mortality in Tenement Houses in which three or more Deaths occurred in the Year 1870.

(The small numeral over any particular house represents the number of deaths which occurred in that house in 1869.)

STREET.	Houses in which Three Deaths occurred.	Houses in which Four Deaths occurred.	Houses in which Five Deaths occurred.	Houses in which Six or more Deaths occurred. (Numerals in parentheses showing the actual number of Deaths in the respective houses.)
Albany		19		
Allen	25, 33, 43, 53, 98, 129.	74	48, 81[4], 96, 200.	100 ([8]).
Attorney	155[2], 160.	33, 82, 162.	122, 157.	
Avenue A	29, 34, 52, 66[2], 68, 97, 123, 174, 180, 219, 235, 249, 258, 281, 317.	47, 184.		272 ([7]).
Avenue B	63[2], 186.			
Avenue C	40, 148, 183, 200[2], 206[4], 208[2].			
Avenue D	4[5].			
Batavia				5 ([6]).
Baxter	20, 36[1½], 49, 53, 61[4], 128[2], 137.	14[7], 36[5], 40, 90[4], 119[7].	31, 74, 94[2].	17 ([6]), 38[4] ([7]).
Bayard	20.	107[6].		
Birmingham	4[4].			
Bowery	217.			
Bridge			1[6].	
Broome	26, 90, 151, 220.	13.	73, 317.	475 ([6]).
Canal		108.		
Cannon	15, 16, 96.	69.		
Carlisle			5.	
Carmine	75[4].			
Cedar	129[3].			
Cherry	16, 19[5], 34, 38[4], 88, 142[4], 150[4], 219[5], 224, 244, 366, 391, 446.	18[8], 56, 65, 146, 212, 362.	102, 324.	141[5] ([6]), 36[12] ([11]), 140[3] ([11]).
Christopher		118.		
Chrystie	48, 54[5], 82, 88, 95.	50, 189.		
City Hall place	19[2].	84.		15 ([6]).
Clarkson	12.			
Clinton	6, 17, 21, 48, 89, 181, 185.	36, 69, 179.	20[2].	42 ([6]).
Clinton place	128[4].			
Columbia	79, 83.			
Crosby	135.		85.	
Delancey	80, 209, 321.			46[5] ([7]).
Desbrosses	7.			
Division	75, 250.	176.		244 ([7]).
Downing		16½.		
Dry-Dock	1½.			

STREET.	Houses in which Three Deaths occurred.	Houses in which Four Deaths occurred.	Houses in which Five Deaths occurred.	Houses in which Six or more Deaths occurred. (Numerals in parentheses showing the actual number of Deaths in the respective houses.)
East Broadway.	82, 139.	.....	.....	.....
East Houston.	147, 242, 254[5], 260[3], 333, 371, 403.	177.	.....	.....
East 4th	122, 150[6], 194[4], 197, 223, 310.	159[4], 173, 207.	152.	.....
East 10th	356, 360, 380, 412, 414.	238.	303, 383.	.....
East 11th	420[7], 428[3], 510, 533, 534[3], 535, 619, 630[4], 646.	302[3], 504, 510, 540, 546, 642.	326, 643[4].	333[5] (6).
East 12th	331, 335, 506[3], 513, 515, 517, 524, 609, 612, 634, 641[3], 720.	312[3], 344, 400, 510, 520, 537, 635[3].	511[5], 532, 627.	.....
East 13th	415, 424, 444, 507, 517, 546, 609, 622, 626, 634, 638, 646[4].	442[4], 443[7], 508, 539.	.....	509 (7).
East 14th	423[3], 437[3], 514, 520, 528[3].	404[6], 421, 510.	409, 417[3].	431 (6), 508[3] (6).
East 15th	403, 410, 416, 422, 423, 424, 429, 433, 435, 437[3], 523[3].	430, 512, 513, 547.	432, 517[3].	419 (6), 425 (6).
East 16th	418, 420, 427, 509, 510[4], 512, 514, 541.	424, 434.	516.	.....
East 17th	404, 420, 433, 437[5], 502[3].	407, 418, 504, 508.	413, 435.	.....
East 18th	406[3], 407, 410, 412, 419[3].	423[4].	408[5], 435[4].	.....
East 19th	.....	439.	.....	.....
East 20th	.....	209.	.....	.....
East 21st	.....	339.	.....	404 (7).
East 22d	204.	239, 329[4], 331.	228, 337.	.....
East 23d	441[3].	.....	.....	.....
East 24th	309, 311.	.....	305, 340.	.....
East 25th	315.	.....	.....	.....
East 26th	302, 308, 332.	.....	.....	.....
East 27th	338.	.....	.....	.....
East 28th	.....	245.	.....	.....
East 30th	244.	343.	.....	.....
East 31st	351.	.....	330.	.....
East 32d	42, 327.	331.	.....	.....
East 33d	316.	.....	.....	.....
East 34th	333[3].	331.	.....	.....
East 35th	313.	.....	.....	.....
East 36th	320.	.....	.....	.....
East 38th	.....	219.	.....	.....

STREET.	Houses in which Three Deaths occurred.	Houses in which Four Deaths occurred.	Houses in which Five Deaths occurred.	Houses in which Six or more Deaths occurred. (Numerals in parentheses showing the actual number of Deaths in the respective houses.)
East 39th	333[2].	308, 329.	.....	.....
East 41st	242.	240.	.....	.....
East 46th	228, 344, 349.	230.	.....	.....
East 47th	240, 337.	220.	.....	338 (6).
East 48th	334.	.....	.....	338 (6).
East 53d	314.	.....	.....	.....
East 54th	.....	347[2].	.....	.....
East 60th	328.	349.	.....	.....
East 74th	215, 223.	.....	.....	.....
East 82d	103.	.....	.....	.....
Eighth	314, 326, 373, 377[2], 379.	369, 374.	.....	.....
Eighth avenue	338.	.....	.....	.....
Eldridge	9, 36, 73[4], 78, 95, 105, 157[4].	51, 75, 109, 159.	.....	.....
Eleventh ave	672.	601.	.....	.....
Elizabeth	79, 177, 183, 214, 228, 233, 241.	139, 157, 181, 184.	153.	8[4] (6).
Essex	16[2], 85, 90, 140, 144, 166, 178.	38[4].	17.	148[2] (7).
Fifth	411, 417, 428, 510, 513, 643, 804.	407[6], 434, 527[2], 627.	403, 404, 405, 412, 508, 522, 644[5].	515 (6), 518 (6), 521[2] (6).
First	53, 95.	39.	.....	.....
First avenue	35, 41, 51, 78, 91[2], 93, 96, 276, 330, 397, 401, 517, 828, 834, 891, 969.	36, 53, 57, 181, 260, 365, 442, 523, 827, 856, 952, 1026, 1093.	124, 184, 296.	420 (7).
Forsyth	5, 17[5], 46[7], 139, 151, 188, 201.	40, 48, 69, 199.	18[4].	16 (6).
Frankfort	84.	29[6].	.....	87[3] (6).
Front	304, 350.	.....	.....	.....
Goerck	7, 38.	.....	.....	73[5] (7).
Gold	96.	.....	.....	.....
Greene	92, 211.	.....	.....	.....
Greenwich	38, 345[4], 419, 447, 564.	101[5], 125[3], 414.	234.	.....
Hague	8[6].	.....	.....	.....
Hamilton	.....	16½.	30.	35 (7), 38[5] (7).
Henry	54[3], 71, 238, 330.	77[4], 90[3].	.....	45 (6), 92[6] (8).
Hester	3, 4, 5, 87[2], 89.	7, 103[1], 176.	.....	88 (6).
Horatio	32.	.....	.....	4[5] (7).
Hubert	16.	.....	.....	.....
Jackson	.....	32[3].	.....	34[5] (7).
James	9, 55, 93.	69.	24[3], 61[4].	.....
Jefferson	.....	.....	.....	37 (6).
Jersey	10.	.....	8.	.....
King	74, 79.	71[3].	.....	.....
Laurens	28, 77, 186.	.....	.....	79 (6).
Leonard	153.	.....	.....	.....

STREET.	Houses in which Three Deaths occurred.	Houses in which Four Deaths occurred.	Houses in which Five Deaths occurred.	Houses in which Six or more Deaths occurred. (Numerals in parentheses showing the actual number of Deaths in the respective houses.)
Lewis	78[5], 80, 81, 87, 105½, 163.	76, 107.	41.	63 (7).
Little 12th	15.			
Ludlow	9, 17, 28, 137[4], 151, 163, 167[3], 177.	11, 150[3].		
Madison	41, 101, 118, 170, 324, 354, 362.	7, 116[3], 183[5], 184, 353, 363.	28, 212.	237[4] (5).
Manhattan, (11th Ward)	6.			
Marion	25.			
Monroe	9, 17, 39, 90, 110, 173, 242[4], 265[3], 322.	13, 114, 263[3].		311[3] (5).
Montgomery	73.			
Mott	13, 22, 24, 65[5], 102[7], 104, 122, 126, 157, 195[3], 228, 299[4], 307, 310.	49[5], 60[7], 66, 133, 141, 156[3], 220, 232[3].	47[4], 237.	15[4] (5), 250[2] (6).
Mulberry	22, 35, 37[6], 38[5], 41[7], 86, 108[6], 115[6], 169, 195, 231.	24[5], 33, 49[4], 51[6], 82[5], 88, 166.	59[4].	9[15] (5), 113[3] (7), 120 (7).
Ninth	605, 609, 617, 632, 634, 645.	643, 744.	437.	
Ninth avenue	494, 750.	319, 413.	502.	
Norfolk	1, 31, 68, 127.	5[3], 49, 93, 161.		
Oak	32[4], 38[5].	31, 36½.		
Oliver	43[3], 49, 54[3].	64, 72[3].		
Orchard	3, 24, 139, 141, 153, 183, 185, 187.		13.	
Park	39[6], 47.		33, 67.	
Pearl	363, 422, 479[4], 528, 545.			
Pell	25.	12.		
Perry	17, 161.			
Pitt	29, 33, 35, 37, 47, 92[5], 125.	42, 137[5].		135 (7).
Prince	33, 51, 156[4], 161.	49.		
Rector	33[3].			
Ridge	30, 42[3], 57, 60, 80, 88, 113, 115, 117[4].	33.	98, 102, 112.	79 (5), 106[3] (6).
Rivington	159, 254, 263, 296, 298.			194 (5).
Roosevelt	52.	18, 77½.		105 (7).
Rose	25.	55.		
Scammel	22.			

STREET.	Houses in which Three Deaths occurred.	Houses in which Four Deaths occurred.	Houses in which Five Deaths occurred.	Houses in which Six or more Deaths occurred. (Numerals in parentheses showing the actual number of Deaths in the respective houses.)
Second	158, 160[3], 198, 235[4].	194[3], 237.	161, 199[4], 223.	
Second ave.	26[3], 35[3], 400, 424, 592, 741, 894, 1123[3].	8, 694, 720, 1055, 1114, 1406.	853.	
Seventh	170, 202, 249.	160.	116.	
Seventh ave	107, 390, 407, 414.			
Sheriff	52, 58[3].	120[3].		
Sixth	324[5], 340, 438, 508, 524[4], 527[3], 529, 538, 602.	401, 404[3], 412, 434[3], 531, 533, 622.	336.	420[3] (6).
Spring	32[4], 40, 117[3].	54[3].	187[5].	41 (6).
Stanton	161, 173, 214, 234.	42[3].	248, 318.	116 (7).
Staple		64.		
Suffolk	14[5], 26, 69, 127, 128, 129, 135.	71, 114.		116 (7).
Sullivan	113[4], 212.	41[7].	43.	
Tenth avenue	89, 270, 493, 506.	307[3], 742.		86 (7).
Thames	15, 20, 24[4].			
Third	87, 111, 113, 114, 118, 128, 130, 132, 137, 174, 210, 222, 245[3], 352.	86, 115, 160, 187, 211, 214[3], 240.	138[3], 234.	123[4] (6), 126[3] (6), 229 (6), 50 (7), 129 (8), 224[5] (8).
Third avenue	623, 710, 774, 861, 947, 1006, 1336.	1057, 1333.		86 (7).
Thomas	28[3].			46 (6).
Thompson	33, 57[3], 180.	12[3], 44[3], 59[5].		
Vandewater	8[5], 9, 25[6], 27.	5[6].		
Washington	28, 29[3], 37[4], 51, 87, 102[4], 139[3], 429, 507[3], 509, 757[3].	35[3], 38[3], 107, 759.	15[3].	10[4] (6), 26[7] (8).
Water	608, 698.		342.	
West	60, 534.			
West Broadway	55, 62.	60[3].		
West Houston		300[6].		
West 4th	323[4].			
West 13th	403.			
West 16th	338, 354.			
West 18th	230[4], 243.	154[3], 158.		
West 19th	442.		505.	
West 20th	159.			
West 25th	319, 357, 437.			
West 26th	210, 211, 434, 549, 553.	464, 502[3], 551[5].	340, 541.	335 (6).
West 27th	226, 241, 326, 447, 448, 520, 528, 542.	222.		218 (6), 159 (7).

STREET.	Houses in which Three Deaths occurred.	Houses in which Four Deaths occurred.	Houses in which Five Deaths occurred.	Houses in which Six or more Deaths occurred. (Numerals in parentheses showing the actual number of Deaths in the respective houses.)
West 29th	135, 154, 156, 444[2], 476, 506, 509.	155, 159.	530.	
West 29th	219, 440.	530.		
West 30th	113, 132, 246, 521.	153, 252.		
West 31st		145.		
West 32d	239, 246, 444, 450.	244, 262.		
West 33d	443.	470.		
West 35th	434.			
West 36th	325, 445.	338, 344, 417.	426.	
West 37th	306, 331.	252.		
West 38th	520.			
West 39th	306, 333[5], 425[3], 429[2], 453.	314[3], 330.		
West 40th	356, 445[3].	426, 448[4].		
West 41st	161, 252, 315, 349, 405, 459.	254, 448.		
West 42d	551.	553[4].		
West 43d	353.		534.	550 (6).
West 44th	323, 342, 402, 505, 509.			
West 46th	502, 514.			
West 47th		259.		
West 48th	421, 601, 618.			
West 49th	124.			
West 50th	200.	141[4], 441.		
West 52d	423.			
West 54th	423, 542.	546.		
Willett	68, 94, 96, 116, 127.	24, 64, 74, 86, 90, 121.		119½ (6).
William		221.		
Worth				3 (7).
Total No. of Houses	606.	261.	91.	74.
Total No. of Deaths in these Houses	1,818.	1,044.	455.	490.

investments yielding ample returns by purchasing these now idle buildings and converting them into, or constructing in their stead, model tenement houses, in a district of easy access to most parts of the town. Houses of this character have proved most successful in London under the philanthropic auspices of Sir Sidney Waterlow and the able practical supervision of Mr. Allen, the two master-spirits of the "Improved Industrial Company," and are now producing 12 per cent. upon the original capital subscribed. Large, well-ventilated, imposing and agreeable in appearance, under strict hygienic regulation, and with domiciles at moderate rents, such dwellings would attract those classes that are not utterly degraded, and would likewise from their associations exert a powerful moral influence upon their inmates, and indirectly upon thousands of others. It is only in this manner that the social elevation of our poor can be effectually reconciled with the material interests of philanthropy, if such expression may be employed. "Depend upon it," once said that good man, the late Prince Albert, while presiding at a meeting of a society for improving the condition of the working classes, "that the interests of the often-contrasted classes are identical, and it is only ignorance which prevents their uniting to the advantage of each other." We borrow an account of these London habitations from an interesting letter by Dr. H. I. Bowditch, of Boston, to the State Board of Health of Massachusetts:

"THE IMPROVED INDUSTRIAL DWELLING COMPANY," OR THE UNION OF PHILANTHROPY WITH CAPITAL, AND WITH PERFECTLY SUCCESSFUL RESULT TO BOTH PARTIES.

"A thorough insight into the operations of this company is all-important for all who desire to know how to erect good homes for the people. In Boston, the experiment has been successfully tried on a small scale. Two or three model lodging-houses have been built, and have done good to a few families, and at the same time they have returned six per cent. interest on capital over and above all incidental expenses. But nothing has ever been carried out on so grand a scale as by the above-named company in London.

"Whilst the Peabody and the Columbia square buildings do not pretend to pay more than the smallest return to capital, the buildings of the Industrial Company give such ample returns that the directors have refused (because so fully occupied with erecting new buildings) to receive more money for the present year. While the former cannot give an entire home and separate water-closets, washing-room, etc., to each family, the latter have contrived to do so, though at a somewhat higher rent. Nay, it is one of the cardinal ideas of the prominent workers of this company, not only to provide such a home, but to so arrange it that the parents shall always have a chamber, and that the sexes

shall be entirely apart among children. Moreover, the buildings are so planned that every room or bedchamber may be exposed to the open air, and shall not open into long corridors, flanked by water-closets on either extremity, as in the Peabody and Coutts Buildings. All of these arrangements of the 'Waterlow' Buildings are infinitely superior, in a sanitary point of view, to arrangements for the same purpose found in the other two. Previous to the rising of this company, some unsuccessful experiments had been made to unite these two apparently hostile elements, capital and philanthropy.

"At length the two leading spirits of the Improved Industrial Company, that has accomplished this complete union, met—employer and employed, each a genius in his own department. The able financier, the wealthy humane man, one of broad, generous views, and of a good common sense, the head of a large printing establishment, alderman of the city of London, Sir Sydney Waterlow, agreed to advance money to the practical mason, Mr. Allen. This mason labored with his hands, but his heart was full of good-will to the poor, among whom he was born, and had lived nearly a half century. He saw them daily everywhere around him suffering for want of 'good, healthy, and tasteful homes.' His head became full of plans for the erection of buildings for that desirable object. He knew all the dire wants of the case, for he had grown up under the same pressure. Hitherto the home of the working man has been neglected; 'consequently,' remarked Mr. Allen, 'he has resorted to the tap-room, where alone he has found brightness and mirth.' Fortunately Mr. Allen was brought into relations with the rich capitalist above alluded to, who had employed him as a mason, and with him he urged his plea. Sir Sydney Waterlow listened with attention and interest, and with three other friends agreed to advance the means upon the plan suggested by Mr. Allen, provided, on its examination by an accomplished architect, it should be found to be according to strict legal and architectural principles, so as to give safety to every room and individual in it. The result was favorable, and from that time to this, viz., from 1863, Sir Sydney with others, forming a limited company, have continued to build and to extend their operations, Mr. Allen remaining as their architect and chief superintendent.

"This company was originated in the above-named year, and made its first half-yearly report in 1864. Sir Sydney has been its chairman and main-spring since its origin, and to the vigor, fine spirit, and practical sense of these two men, with ample means at their disposal, it doubtless owes its perfect success. The following extracts from the remarks of Mr. Goshen, Member of Parliament, at the seventh half-yearly meeting held at the Mansion House, February 14, 1867, may be quoted. He said that he felt 'that the company was not only one of great private interest, but also of great public importance;' and that 'the greater the extent to which the principle could be carried, the better we should be able to solve the great problem as to how our laboring classes are to be accommodated.' 'It has been asserted, that when a low class of houses are pulled down, and new buildings, replete with all the improved sanitary arrangements, are erected in their stead, it can only be done at a loss. I consider that it is the object of this company to disprove that assertion, and to show that good buildings can be erected in the place of bad ones at a profit instead of at a loss.' 'A profitable business can be done if sites are judiciously selected.' Some of the speakers alluded, as capitalists, to their gratification at the fact of the good return for the money invested. One regretted that the houses were not for the very poor laborer, but rather for the common mechanic. To which re-

ply was made that, if the artisan leaves his present home, the laborer will move into it, and thus both be improved in condition.

"The directors in their report say, 'during the previous four half-years dividends of five per cent. had been paid, and a sum equal to 25 per cent. of the net profit was carried to a reserve fund.' The directors believe that, from their previous experience, there was a fair prospect of an annual profit of at least six per cent., after making liberal allowance for contingent expenses.

"The following appears in the fourteenth half-yearly report made at a meeting held at the Mansion House, June 12, 1870.

"'The whole of the share capital, viz., £125,000, has been subscribed, and a further sum will be borrowed at 4 per cent. from the Public Work Loan Commissioners, which will represent a total capital of £250,000. The company had generally houses well occupied, except at Greenwich, where, owing to the depression of trade in that locality, they suffered as the Peabody Buildings at Shadwell had, viz., from a loss of tenants.'

"The estates of the company, with number of tenements in each, are as follows:

	Tenements.				
	3 Rooms.	2 Rooms.	1 Room.	Shop.	Total.
Cobden Buildings, King's Cross Road	8	10	.....	2	20
Nelson Buildings, Bridge street, Greenwich	20	20	.....	.....	40
Tower Buildings, Brew-house Lane, High street, Wapping	30	30	.....	.....	60
Stanley Buildings, Old Saint Pancras Road, King's Cross	51	50	.....	3	104
Palmerston Buildings, City Garden Row, City Road	36	36	.....	.....	72
Cromwell Buildings, Red Cross street, Southwark	10	12	.....	2	24
Derby Buildings, Britannia street and Wicklow street, King's Cross Road	40	118	.....	10	168
Gladstone Building, Willow street, Finsbury	84	84	.....	.....	168
Waterlow Buildings, Bethnal Green Estate.	21	48	3	.....	72
Total completed	300	408	3	17	728
Buildings in course of erection at Ebury street	50	60	.....	10	120
Buildings in course of erection at Ebury square	40	25	.....	4	69
Buildings in course of erection at Bethnal Green	40	130	.....	.....	170
Total either erected or being erected..	430	623	3	31	1,087

"With exception of 72 tenements in the Derby Buildings, where one scullery and copper, etc., are provided for every three dwellings, each tenement has a separate washroom, copper for heating water, water supply and other conveniences, the cost of which is about equal to that of a room.

"The method pursued in raising the funded capital is as follows. I quote from the prospectus issued in the year 1867:

"'Capital, £250,000, of which £65,000 were then subscribed. Shares, £25 each, £5 to be paid on allotment, and the remainder in calls of not more than £5 per share, at intervals of not less than three months.'

"A bill has been recently passed which will enable the company to largely increase the extent of its operations by borrowing of the government, at 4 per cent. interest, a sum equal to the outlay on its buildings. A profit of £5 1s. per cent. interest (being nearly 1 per cent. less than the estimated annual profit) will be sufficient to repay both principal and interest of the loan at 4 per cent., from which it will follow—first, that the saving of nearly 1 per cent. on the borrowed portion will increase the profit on the shareholders' part of the capital to 7 per cent.; and, second, that at the expiration of forty years (during which the loan is current) the unencumbered reversion to the buildings created by the investment of the borrowed money will double the value of the company's estate. This anticipation, too, is irrespective of the ordinary progressive increase in the value of landed property. Houses in some districts of London double in value in the course of a few years.

"The evils of great towns spring almost entirely from overcrowded and ill-constructed dwellings, and no permanent benefit can be conferred on the working classes until this, the primary evil, is removed.

"Of the buildings mentioned above, I visited the Cobden, Derby, Stanley, Cromwell, Gladstone, and Tower. I also examined a new block erecting at the expense of Mr. Allen, and called by his name. They all have the same general appearance, excepting that the Derby has a less imposing aspect than the rest. The others present a very neat appearance, not to use a higher epithet, built as they are of brick and manufactured stone, with stone-finishings and steps, and iron balustrades on each. Everything I saw looked very clean, and the superintendents assured me that the same general results as to health and morals followed in their train, as noticed in the Peabody and Coutts buildings. Tenants dislike to leave, and, if trade for a time compels them to leave, they gladly return. The sole objection is that above alluded to, viz.: that the rents necessarily are a little higher than most of the very poorest can pay, averaging about twice as much as is asked in the Peabody Buildings, while giving many more conveniences and an entire home to each family. The following table shows the rents per week for some of the buildings, and gives an idea of the whole:

BUILDINGS.	FOUR ROOMS, KITCHEN, ETC.	THREE ROOMS, KITCHEN, ETC.	TWO ROOMS, KITCHEN, ETC.	ONE ROOM, KITCHEN, ETC.	NO. OF FAMILIES.
Derby	.....	7s. 6d.; at top, 5s. 9d.	7s. 3d.; at top, 5s. 5d.	.....	168
Cobden	.....	7s.; 4th story, 6s. 6d.	5s. 6d.; 4th story, 5s.	.....	.....
Stanley	.....	7s.; at top, 5s. 6d.	6s. 6d.; at top, 5s.*	.....	103
Allen	9s.	.....	5s. 6d.; 6s. 6d.	4s.	70

* With two bed closets.

"In the building now erecting at Bethnal Green, one room only is provided. We cannot but hope that this also will prove a success, even at a lower rate. Nevertheless, considering the very perfect houses thus provided with two, three, or more rooms and all their addenda, and this within very short distances from the workmen's place of labor, we cannot call the rents high.

"Of course it was important to see and converse with the men most interested in this great, this growing and most successful company, whether we consider it in the light of the investment of capital or as a matter of sanitary reform, destined to exert immense influence on the future health of the English people. These interviews I sought. They only convinced me more than ever of the philanthropic views and the wisdom and far-reaching sagacity of Sir Sidney Waterlow and of his able assistant, Mr. Allen. 'I build for the future,' said the latter to me on one occasion. 'I have lived and toiled among the working men of London over forty years, and I know their necessities and their desires. They have been all that while steadily but slowly improving. I feel sure that some time after I am dead every mechanic will live in such buildings as we are now erecting. Each one will have his own neat tasteful home.' Mr. Allen believes in cultivating the æsthetic part of the nature of man. A well-trained flower on the window-sill reveals to him humanity somewhat more developed and a better tenant to be chosen for his newly-built houses, than when he finds neglect in this particular. Yet this man is a workman, and uses his trowel, if need be, and dresses as a workman should when at his daily labor. Sir Sydney is the complement of him, a philanthropic financier, with ample means and full of enthusiasm for the ideas underlying their great mutual undertaking. Sir Sydney considers the company as equally a fine success as a sanitary measure and as an investment for capital. Everything is conducted on the most rigid economy; no salaries are given. Mr. Allen, who has already amassed a sufficient sum to enable him to build a block of buildings on his own account, assures me that the company never makes less than twelve per cent. He expects to make that with his own at the prices above named, and all the rooms are engaged before the house is finished.

"On the plan herewith given are seen the arrangements of six tenements or one-half of one story of 'Allen's Building,' near Finsbury square. It is the latest tenement erected by Mr. Allen, and was opened in September, 1870. The building is of brick, with stone finishing. It is five stories high. The rooms are eight and a half feet high from floor to ceiling. The front is about one hundred feet on the street. Its depth is a little over forty feet. The central part of the front line is set back a short distance, and has four bay windows on each story. The two end portions present, therefore, the appearance of wings added on each side of a more elaborately constructed centre. The structure has a certain degree of elegance and refinement about its exterior which would make it not inappropriate for any of the fashionable streets of the metropolis. Yet it is filled wholly with a series of small tenements, very convenient and perfectly lighted and ventilated, the homes of some of the humblest of the people of London. These homes are constantly occupied. The site of the building is directly opposite a wretched low tenement house analogous to the 'Crystal Palace' in Lincoln street, Boston. Mr. Allen feels sure, from his previous experience of the influence of the Waterlow Buildings, that the silent example of his house will tend to elevate the character of its opposite neighbor."

Vital Statistics of Hospitals and Other Benevolent Institutions of

(See Note at end

NAME OF INSTITUTION.	PRESENT CAPACITY—NUMBER OF BEDS.	REMAINING DECEMBER 31, 1869.	SEX.		NATIVITY.		TOTAL NUMBER OF NEW CASES THAT RECEIVED CARE IN THE INSTITUTION.	SEX.		NATIVITY.	
			Males.	Females.	Native.	Foreign.		Males.	Females.	Native.	Foreign.
Almshouse	1,106	1,114	653	461	85	1,029	3,201	1,475	1,726	434	2,767
Blind Asylum	92	84	43	41	11	73	91	65	26	9	82
Penitentiary	732	461	377	84	218	243	1,769	1,434	335	860	909
Workhouse	1,500	529	327	202	237	292	19,292	8,062	11,230	5,187	14,105
Nursery, Randall's Island	1,031	567	361	206	408	159	1,918	989	929	1,275	643
Idiot Asylum	106	116	70	46	....	.....	49	30	19	.....	.....
Relapsing Fever Hospital	.....	.....	....	....	....	.....	1,673	1,040	633	545	1,128
Inebriate Asylum	275	85	50	35	34	51	1,270	682	588	392	878
Soldiers' Retreat	285	65	65	...	6	59	511	511	.....	91	420
City Prison (cell-rooms)	178	284	186	98	125	159	30,271	16,982	13,289	10,283	19,988
Home for Incurables	120	97	44	53	12	85	95	50	45	13	82
Bellevue Hospital	1,000	709	369	340	230	479	7,426	4,182	3,244	1,992	5,434
Charity Hospital	830	1,007	469	538	217	790	7,452	4,004	3,448	1,988	5,464
Small-pox Hospital	112	84	46	38	16	68	977	530	447	317	660
Fever Hospital	81	53	30	23	9	44	1,218	760	458	429	789
Lunatic Asylum	699	1,182	424	758	229	953	708	297	411	145	563
Epileptic and Paralytic Hospital	120	116	49	67	67	47	118	86	32	47	71
Nursery Hospital	226	194	109	85	194	.....	616	445	171	616	.....
Infants' Hospital	367	254	122	132	254	.....	923	464	459	923	.....
Reception Hospital, Centre street	30	.....	....	....	....	.....	725	597	128	257	468
N. Y. State Emigrant Hospital	.....	811	....	....	....	.....	8,280	.....	.....	.....	.....

the City and County of New York, as Reported December 31, 1870.

of this Table.)

DISCHARGED—1870.	SEX.		NATIVITY.		DEATHS—1870.	SEX.		NATIVITY		DEATH-RATE PER 1,000	PERCENTAGE OF MORTALITY ON TOTAL.	REMARKS AND LOCATION.
	Males.	Females.	Native.	Foreign.		Males.	Females.	Native.	Foreign.			
3,024	1,391	1,633	426	2,598	72	48	24	11	61	16.68	1.66	Application daily at 66 Third avenue; Blackwell's Island.
78	59	19	8	70	3	2	1	....	3	17.14	1.71	Application daily at 66 Third avenue; Blackwell's Island.
1,569	1,259	310	754	815	13	11	2	6	7	5.83	.58	Blackwell's Island.
18,636	7,823	10,813	4,608	14,028	130	84	46	36	94	6.56	.65	do
1,950	916	1,034	1,132	818	.....	....	....	....	.....	.....	.....	Randall's Island.
20	14	6	.....	.....	4	2	2	....	.....	24.24	2.42	do
1,558	965	583	.....	.....	115	75	40	23	92	68.73	6.87	Opened Feb. 26, closed Aug. 8, 1870. Patients transferred to Fever Hospital, B. I.
1,109	574	535	332	777	3	3	....	1	2	2.20	.22	Ward's Island, opened July, 1868.
317	317	.....	62	255	8	8	....	1	7	13.88	1.38	Ward's Island.
10,591	7,756	2,835	4,162	6,429	19	18	1	7	12	.62	.06	New York City (Centre street).
23	10	13	2	21	76	45	31	11	65	395.62	39.56	Blackwell's Island.
6,883	3,827	3,056	2,215	4,668	1,071	614	457	335	736	131.65	13.16	Births—males, 320: females, 278. Foot of East Twenty-sixth street, East river; established year 1826.
6,988	3,677	3,311	1,918	5,070	662	413	249	142	520	78.25	7.82	Blackwell's Island, foot of Sixty-first street, East river.
933	495	438	281	652	100	64	36	45	55	94.25	9.42	Blackwell's Island, foot of Fiftieth street, East river.
1,170	723	447	402	768	68	47	21	22	46	53.50	5.35	West end of Blackwell's Island.
453	198	255	96	357	132	59	73	38	94	60.98	6.09	Blackwell's Island, opened 1839.
112	73	39	41	70	26	20	6	9	17	111.11	11.11	Blackwell's Island, opened 1867.
623	441	182	623	.....	38	23	15	38	.....	46.91	4.69	Randall's Island, opposite One Hundred and Twenty-second street.
537	265	272	537	.....	429	226	203	429	.....	364.48	36.44	Randall's Island, established 1866.
655	438	117	233	422	57	50	7	16	41	78.62	7.86	Opened June 27, 1870; births, 2 males.
.....	.....	.....	.....	.....	497	....	....	....	.....	54.67	5.46	Births during 1870, 464. This institution is under the care of the Commissioners of Emigration, and located at Ward's Island.

NAME OF INSTITUTION.	PRESENT CAPACITY—NUMBER OF BEDS.	TOTAL No. OF NEW CASES THAT RECEIVED CARE IN THE INSTITUTION—1870.	SEX.		NATIVITY.		REMAINING DECEMBER 31, 1869.	SEX.		NATIVITY.		DEATHS—1870.	SEX.		NATIVITY.		DEATH-RATE PER 1,000	PERCENTAGE OF MORTALITY ON TOTAL.	REMARKS AND LOCATION.
			Males.	Females.	Native.	Foreign.		Males.	Females.	Native.	Foreign.		Males.	Females.	Native.	Foreign.			
St. Vincent's Hospital	150	997	485	512	.....	.....	62	.....	.....	.....	.....	107	61	46	.....	.....	101.04	10.10	Corner of Eleventh street and Seventh avenue. Founded 1849.
Mount Sinai Hospital	82	677	454	223	60	617	46	27	19	12	34	51	34	17	9	42	70.54	7.05	No. 239 West Twenty-eighth street. Opened June, 1855.
German Hospital and Dispensary	.....	693	567	126	25	715	47	37	10	.....	.....	91	75	16	.....	.....	122.97	12.29	Corner of Lexington avenue and Seventy-seventh street. Opened September, 1869.
St. Franciscus' Hospital	92	861	656	205	52	809	84	57	27	7	77	72	54	18	10	62	76.08	7.60	Nos. 407 and 409 Fifth street. Opened October, 1864.
Bloomingdale Asylum for the Insane	175	314	143	171	223	91	166	74	92	127	39	27	12	15	19	8	56.25	5.62	One Hundred and Seventeenth street, on Bloomingdale road.
Colored Home	300	591	323	268	.....	.....	251	104	147	.....	.....	135	73	62	.....	.....	160.33	16.03	Sixty-fifth street, east of First avenue.
Hahnemann Hospital	10	51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
N. Y. Asylum for Lying-in Women	24	81	.....	81	7	74	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	37.03	3.70	No. 35 Marion street. Founded 1833.
Manhattan Eye and Ear Hospital	13	198	132	66	.....	.....	7	2	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	No. 233 East Thirty-fourth street. Opened October, 1869.
N. Y. Ophthalmic Hospital	6	51 / 1,316	17	34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
St. Luke's Hospital	61	1,012	627	385	408	604	.....	.....	.....	.....	.....	140	87	53	.....	.....	137.35	13.73	Fifty-fourth street, between Fifth and Sixth avenues. Report is made up to St. Luke's day, October 18, 1870.

FOUNDLING HOSPITAL.

No. 3 North Washington square. Opened November, 1869.

Forty-three per cent. of all the Infants left were in a sickly and dying condition from premature exposure to cold, sickness, or prematurity.
The mortality was 63¼ per cent. (including the sickly and premature at entrance) of all retained in the Institution.
The mortality among those placed out at nurse was 97 per cent.
The mortality among healthy Infants, excluding sick, dying, and premature at entrance, was 25¼ per cent.
Of the Infants left the very great majority were under ten days old. (See note on page 240.)

Present Capacity of the Institution.		In the Institution Dec. 31, 1869.		Received during the Year 1870.		Placed out at Nurse 1870.		Remaining out at Nurse Dec. 31, 1870.		Sick belonging to the Institution Dec. 31, 1870.		Taken sick during the Year in the Institution.		Received in a sickly and dying condition during the Year.		Premature, received during the Year.		Died inside during the Year.		Died outside during the Year.		Discharged.	
		Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
Infants, 85; Nurses, etc., 40.		20	61	727	672	353	320	257	130	14	13	196	92	206	290	58	46	304	236	106	180	98	84
Total both Sexes.....		81		1,399		673		387		27		290		496		104		540		286		182	

NURSERY AND CHILD'S HOSPITAL.

Lexington avenue, corner of Fifty-first street. Opened 1859.

PRESENT CAPACITY.	DEATHS DURING 1870.
Beds. West-house..... 69 East-house..... 32 Dormitory..... 60 Total.....154 Cribs..... 75 Each crib is intended for two Infants.	Males, 53; Females, 69. Total, 132. Of this number 125 were Minors and 5 were Adults; 124 were born in the United States, 3 in Sweden and 5 in Ireland.

ADMISSIONS DURING THE YEAR 1870.

NATIVITY.	WOMEN.											
	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
Ireland	6	8	9	9	16	15	12	12	10	13	11	12
United States	8	4	8	2	4	5	4	10	7	5	7	5
Scotland	...	2	...	...	1	...	1	...	...	...	...	...
Germany	3	....	1	2	1	4	2	2	4	3	....	....
Poland	1	....	....	....	....	....	....	....	....	....	....	....
England	1	3	....	1	3	2	2	3	....	....	1	1
Sweden	...	....	1	....	....	....	1	....	1	2	....	1
Total Women 252	19	17	19	14	25	26	22	27	22	23	19	19

BIRTHPLACE.	CHILDREN.											
	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
United States	26	21	35	28	32	24	34	20	18	25	25	22
Ireland	....	....	....	....	....	1	1	....	....	....	....	....
Sweden	....	3	....	....	1	....	....	1	....	....	....	....
England	....	....	....	....	....	....	....	....	....	2	....	....
France	1	....	....	....	....	....	1	....	....	....	....	1
Total Males.....167	Males.....	17	10	18	16	15	12	15	12	5	16	18	13
Total Females.....155	Females.....	10	14	17	12	18	13	21	9	13	11	7	10
Total both Sexes...322	Total.....	27	24	35	28	33	25	36	21	18	27	25	23

NAME OF INSTITUTION.	CAPACITY — PRESENT NUMBER OF BEDS.	TOTAL NUMBER OF CASES THAT RECEIVED CARE IN THE INSTITUTION.	SEX.		NATIVITY.		TOTAL PRESCRIPTIONS AND OUT-DOOR CALLS.	SEX.		NATIVITY.		DEATHS—1870.	SEX.		NATIVITY.		DEATH-RATE PER 1000.	PERCENTAGE OF MORTALITY ON TOTAL.	REMARKS.
			Males.	Females.	Native.	Foreign.		Males.	Females.	Native.	Foreign.		Males.	Females.	Native.	Foreign.			
New York Dispensary	....	38,770	.....	.....	.....	.....	5,290	....	....	....	....	....	....	....	....	....	.....	.....	Corner of White and Centre streets. Founded 1791.
Northern Dispensary	....	15,325	.....	.....	6,878	12,302	3,355	....	....	....	....	91	....	....	....	....	.....	.....	Christopher street and Waverley place. Founded 1827.
Eastern Dispensary	....	22,922	11,852	14,822	12,184	14,490	3,752	....	....	....	....	151	72	79	80	71	.....	.....	Vaccinated 5,258. No. 57 Essex street. Founded 1832.
North-western Dispensary	....	12,207	6,165	8,387	4,867	9,685	2,345	....	....	....	....	70	....	....	....	....	.....	.....	Corner of Thirty-sixth street and Ninth avenue. Founded 1852.
North-eastern Dispensary	....	10,408	4,936	5,472	5,405	5,003	3,101	1512	1589	1511	1590	50	19	31	36	14	.....	.....	No. 222 East Fifty-ninth street. Opened 1862.
Central Dispensary	....	4,676	1,958	2,718	1,838	2,838	5,281	....	....	....	....	....	....	....	....	....	.....	.....	No. 934 Eighth avenue. Incorporated 1869.
Harlem Dispensary	....	3,339	1,931	1,408	1,209	2,130	89	40	49	41	48	8	....	....	....	....	.....	.....	Fourth avenue, between One Hundred and Twenty-fourth and One Hundred and Twenty-fifth streets. Opened 1868.
N. Y. Homœopathic Dispen'ry	....	8,989	.....	.....	.....	.....	1,233	....	....	....	....	28	18	10	18	10	.....	.....	
Orthopedic Dispensary	....	2,522	.....	.....	.....	.....	680	....	....	....	....	3	....	....	....	....	.....	.....	No. 1299 B'way. Estab. 1866.
Western Dispensary for Women	....	1,863	.....	.....	953	910	33	....	....	....	....	3	....	....	....	....	.....	.....	No. 242 Ninth avenue. Opened March, 1869.
German Dispensary	....	16,165	8,234	7,931	5,834	10,331	.....	....	....	....	....	....	....	....	....	....	.....	.....	No. 8 East Third street. Opened May, 1859.
N. Y. Tumor Dispensary	....	21	9	12	8	13	48	39	19	9	39	....	....	....	....	....	.....	.....	Opened September 1, 1870. No. 101 East Thirtieth street.
Eclectic Medical Dispensary	....	2,436	1,015	1,421	1,096	1,340	2,487 113 74,368	....	....	....	....	7	....	....	....	....	.....	.....	
Homœpathic Dispensary	....	31,732	.....	.....	.....	.....	8,480	....	....	....	....	....	....	....	....	....	.....	.....	Bond street, near Bowery.
Demilt Dispensary	....	26,204	10,652	15,552	13,428	12,776	4,121	1687	2434	....	....	96	....	....	....	....	.....	.....	
New York Infirmary	14	145	.....	.....	.....	.....	3	....	....	....	....	1	....	....	....	....	.....	.....	No. 126 Second avenue. Organized 1854.
Ophthal. and Aural Institution	30	229	138	91	.....	.....	2,927	....	....	....	....	1	....	....	....	....	.....	.....	No. 46 East Twelfth street. Opened May, 1869.
N. Y. Eye and Ear Infirmary	75	9,290	.....	.....	3,993	5,297	415	....	....	....	....	....	....	....	....	....	.....	.....	Second avenue, corner of Thirteenth street. Founded 1820.
Society for Relief of Ruptured and Crippled	200	109	53	56	32	77	2,455	....	....	....	....	2	2	....	2	....	.....	.....	Forty-second street, corner of Lexington avenue. Incorporated April, 1863.

NAME OF INSTITUTION.	CAPACITY — NUMBER OF BEDS.	TOTAL NO. OF NEW CASES THAT RECEIVED CARE IN THE INSTITUTION.	SEX.		NATIVITY.		REMAINING DECEMBER 31, 1869.	SEX.		NATIVITY.		DEATHS—1870.	SEX.		NATIVITY.		DEATH-RATE PER 1,000.	PERCENTAGE OF MORTALITY ON TOTAL.	REMARKS.
			Males.	Females.	Native.	Foreign.		Males.	Females.	Native.	Foreign.		Males.	Females.	Native.	Foreign.			
New York Juvenile Asylum...	650	714	.....	.....	627	87	555	450	105	....	....	4	....	....	4	....	3.15	.31	One Hundred and Seventy-fifth street and Tenth avenue. House of Reception, No. 61 West Thirteenth street. Incorporated 1852.
Roman Catholic Orphan Asy'm....	1,005	512	492	.....	.....	.....	.....	....	....	....	....	15	6	9	....	....	14.92	1.49	Inclusive of Fifth avenue, Madison avenue, and Prince street Homes.
Hebrew Orphan Asylum.....	160	181	112	43	.....	.....	148	....	....	....	....	....	....	....	....	....	.....	.....	Seventy-seventh street, near Third avenue. Organized 1822.
New York Orphan Asylum....	200	151	85	66	.....	.....	154	83	71	....	....	....	....	....	....	....	.....	.....	Seventy-fourth street and Bloomingdale road.
Half-orphan Asylum.....	220	102	44	40	.....	.....	210	....	....	....	....	....	....	....	....	....	.....	.....	No. 67 West Tenth street.
Orphan's Home	160	153	.....	.....	.....	.....	.....	....	....	....	....	....	....	....	....	....	.....	.....	No. 101 St. Mark's place.
Leake and Watts' Orphan House.....	250	132	87	45	.....	.....	119	73	46	....	....	....	....	....	....	....	.....	.....	Tenth avenue and One Hundred and Twelfth street. Opened November, 1843.
The Howard Mission and Home for Little Wanderers.....	....	1,245	.....	.....	.....	.....	.....	....	....	....	....	....	....	....	....	....	.....	.....	No statistics kept at the institution. No. 49 New Bowery. Opened 1861.
Institution for Instruction of Deaf Mutes.....	....	50	28	22	50	.....	.....	....	....	....	....	....	....	....	....	....	.....	.....	Broadway, between Forty-fourth and Forty-fifth streets.
Deaf and Dumb Institution...	640	618	360	258	557	61	536	316	220	483	53	12	5	7	10	2	10.39	1.03	One Hundred and Sixty-second street and Bloomingdale road. Incorporated 1817.
N. Y. Institution for the Blind	10	143	.....	.....	.....	.....	.....	....	....	....	....	....	....	....	....	....	.....	.....	Ninth avenue and Thirty-fourth street. Incorporated 1831.
Female Christian Home	40	37	.....	.....	27	10	22	....	....	....	....	....	....	....	....	....	.....	.....	No. 314 East Fifteenth street.
Institution of Mercy.....	....	140	.....	.....	40	160	60	....	....	....	....	1	....	....	....	....	5.00	.50	Distressed females of good character are received into this institution. No. 35 East Houston street.
House of Mercy	95	110	.....	.....	.....	.....	40	....	....	....	....	4	....	....	....	....	26.66	2.66	Foot of West Eighty-sixth street

St. Barnabas House	50	2,227	.....	.....	.....	.....	36	....	....	....	....	1	....	....	....	....	.44	.04	No. 304 Mulberry street. Temporary home for women and children. Children nursery by the day opened at No. 308 Mulberry street July 14, 1870. Present number, 19 children.
Sheltering Arms	125	105	64	41	89	16	90	45	45	78	12	1	1	....	....	....	5.12	.51	Tenth avenue, corner One Hundred and Twenty-ninth street. Organized 1864.
St. Joseph's Industrial School	....	155	.....	.....	.....	.....	95	....	....	....	....	1	....	....	....	....	4.00	.40	Eighty-first street and Madison avenue.
St. Luke's Home	31	30	.....	.....	13	17	.....	....	....	....	....	4	....	....	....	....	133.33	13.33	No. 487 Hudson street. Opened May, 1852.
Colored Orphan Asylum	249	93	60	33	.....	.....	275	170	105	....	....	14	13	1	....	....	38.00	3.80	One Hundred and Forty-third street and Tenth avenue. Founded 1836. Destroyed by rioters, July, 1863. Rebuilt and occupied, 1868.
House of Refuge (Randall's Island)	1000	522	420	92	.....	.....	773	667	106	....	....	6	5	1	....	....	4.63	.46	Randall's Island. Opened 1825. City office, Room No. 41 Bible House.
Five Points House of Industry	30	612	302	310	.....	.....	23	13	10	....	....	4	2	2	....	....	6.29	.62	No. 155 Worth street.
Presbyterian Home for Aged Women	90	10	.....	10	.....	.....	28	....	28	....	....	6	....	6	2	4	157.89	15.78	No. 45 Grove street. Incorporated 1867.
House of Good Shepherd	700	701	.....	701	.....	.....	555	....	555	....	....	18	....	18	12	6	14.33	1.43	East river, Eighty-ninth and Ninetieth streets.
St. Joseph's Asylum	200	83	31	52	73	10	154	89	65	138	16	3	1	2	2	1	12.66	1.26	Corner Avenue A and Eighty-ninth street. Founded 1857.
Home for Aged Females (Hebrews, etc.)	13	15	1	14	4	11	.....	....	....	....	....	....	....	....	....	....	.....	.....	No. 215 West Seventeenth street. Opened May 24, 1870.
Samaritan Home for the Aged	45	41	.....	41	.....	.....	.....	....	....	....	....	4	....	4	2	2	97.56	9.75	No. 409 West Fourteenth street. Opened May, 1867.
Association for Relief of Respectable Aged Indigent Females	....	12	.....	.....	.....	.....	89	....	....	77	12	12	....	....	....	....	118.81	11.88	No. 226 East Twentieth street. Incorporated 1814.
Home for the Friendless and Female Guardian Society	279	577	.....	.....	.....	.....	.....	....	....	....	....	3	2	1	....	....	5.19	.51	No. 29 East Twenty-ninth street. No. 32 East Thirtieth street.
Woman's Aid Society	....	188	.....	188	.....	.....	.....	....	....	....	....	....	....	....	....	....	.....	.....	Forty-second street, near Eighth avenue. North-west corner of Second avenue and One Hundred and Twenty-fourth street.

NOTE.—Discrepancies between the mortality as it appears in the above table and in the annual zymotic table, are accounted for by the fact that in the latter case it is the *registered* mortality. Thus deaths registered early in January, 1870, may actually have occurred in 1869. In regard to Bellevue Hospital, many cases returned by Coroners as "found at the Morgue," and credited to that institution, really do not belong to it. In some instances (as that of St. Francisous) the report given by the hospital is manifestly incorrect.

Nativity and Ages of Decedents during the Year.

Of the 27,175 decedents, 17,461 were of native, and 9,714 of foreign birth, showing among the latter a relative increase, as compared with the previous year, of 1½ per cent.

There were 8,383 deaths among infants less than a year old. These deaths were equivalent to nearly 31 per cent. of the total—being a relative excess of 1.42 per cent. over the infant mortality of 1869, although 2 per cent. lower than that of 1868.

One thousand three hundred and thirty-three deaths occurred among children less than five years of age, or 49 per cent. of the total—being a relative decrease of 2 per cent. as compared with 1869, of 3½ per cent. as compared with 1868, and of 4 per cent. as compared with 1867. In 1866, the number of such deaths was relatively nearly 2 per cent. less than in 1870. This is readily explained by the fact of the comparative immunity of young children from attacks of Asiatic cholera, which in 1866 augmented the mortality among adults very considerably. Altogether, therefore, within the past five years, the mortality among young children in this city has manifested a decided and constant tendency toward improvement.

There was a slight relative decrease in the mortality of persons from five up to fifteen years old during the past year as compared with the previous year—while in that of those beyond fifteen years there was an increase of about 3 per cent.

Respectfully submitted.

CHAS. P. RUSSEL, M.D.,

Reg'r of Records.

REPORT OF DEPUTY REGISTER OF RECORDS.

CHARLES P. RUSSEL, M.D.,
Reg'r of Records.

SIR—In obedience to your request, I have the honor to submit the following brief statement of the system adopted by the Bureau of Records of Vital Statistics of the Health Department of the City of New York since its organization. The Board having established an exalted degree of exactness in the returns of certificates of marriages, births, and deaths, it is essential that a careful examination of each should be made previous to their being placed on their respective records. The death certificates, on account of the inability of a number of medical practitioners to speak the English language, or the fact of their not possessing a diploma from some regular college, demand special attention. The certificate when presented undergoes close scrutiny, and if found to be correct is marked with the initials of the Register, or Deputy Register, and a burial permit granted; * but if the report of the cause of death is insufficient, which is often the case, or if there is any reason for suspicion, it is sent back to the medical attendant for the necessary particulars, and if the circumstances connected with the death are not satisfactorily stated when it is returned to this Bureau, it is forwarded to the coroners for investigation. Between the first of June and December 31, there were 71 imperfect certificates of death thus transmitted, upon which inquests were held. The autopsy in nearly all these cases revealed the reality of an incorrect diagnosis having been made, some of the bodies bearing evident signs of gross malpractice, which led to the arrest and incarceration of the attending physicians. The death certificates when they meet with approval are endorsed by the Reg'r or his Deputy, with the specific cause of death, and the complicating cause, when mentioned, and copied on sheets, and

* Burial permits are granted between the hours of 7 A.M and 9 P.M., week days, and on Sundays from 9 A.M. to 6 P.M.

from the sheets after re-examination are transferred to the Register of Deaths, which cannot be altered or amended without the permission of the Board. With the certificates of deaths and marriages, and the returns of births, it is necessary to be very precise, as there are constant applications for transcripts from the Records, which are furnished, when they are desired for serviceable purposes, gratuitously, as there are no fees attached to or exacted by this Bureau. These transcripts are not only used in this country, but are sent to almost all parts of the world, where they are employed as evidence in legal claims, and if the records were found to be inaccurate might be the means of a deprivation of property, inheritance, identity, or social standing. On account of its great legal value, the most progressive and intelligent nations of Europe have adopted this system of registration, which is highly esteemed by their citizens, as it contains a concise biography of persons holding the highest as well as the most menial positions in the land. All this history can be speedily established for several generations past by reference to the public records. If this system had been carried out since the organization of this Republic it might have been the means of doing away with long and uncertain litigations.

In addition to the above, a number are also furnished for the purpose of procuring pensions for the heirs of deceased soldiers, and are also of value to persons inheriting small amounts of money in banks as proofs of death, facilitating their getting letters of administration. Others are given to deserted and ill-treated wives, whose husbands perhaps have believed that the witnesses of their marriage are dead or cannot be found, or presumed that no proof of it can be obtained and have committed bigamy, which the records of this Bureau have often proven, when no other means were available, and both males and females have been prosecuted for the offence. To give an idea of the growing value of this registration, we may state that the following number of transcripts have been issued from this Bureau, from June 1 to December 31 (7 months), to applicants who considered them indispensable to accomplish the purpose for which they were needed.

Transcripts from the Records of			Deaths	773
"	"	"	Marriages	157
"	"	"	Births	76
Total number of Transcripts from the Records				1,006

The transcripts from the record of deaths are most numerous, as the number reported is exact to a figure and exceeds all the others, while the marriages and births are sadly incomplete, particularly the latter. In addition to this there have also been numerous applications for transcripts of births and marriages of which there was no record.

The returns of marriages and births are also attentively perused, and if found to be correct are entered on their relative records, but there is scarcely a day that some are not discovered to be imperfectly filled up, and upon arrival at this Bureau sent back in a courteous manner to be remodelled.

The marriages, births, and deaths are all alphabetically recorded, and no delay is experienced by persons having an approximate date who are desirous of obtaining information from the records. The different certificates are also filed away in labelled boxes and can be readily procured when wanted. There are also registers for coroners' cases, bodies in transit, deaths occurring in tenement houses, still-births, and a weekly abstract of deaths, which are all under the supervision of competent clerks. A general daily record is also kept, which contains a summary of deaths, including coroners' inquests, bodies in transit, disinterments from city cemeteries, still-births, also marriages and births, the totals of which are given weekly to the press for publication.

Transit Permits.

During the past year 2,649 permits were granted by this Bureau to allow bodies to enter and pass through New York city for burial in other places. Several of these bodies were those of persons who left this city in an infirm condition, seeking to ameliorate the state of their health by a change of climate, but who succumbed to the exhausting fatigues incident to a long journey. In addition to these there were a considerable number forwarded from the different states of the Union and foreign countries for the purpose of interment in some of the spacious cemeteries in the vicinity of this city, or which through the force of circumstances had to pass through New York to be conveyed to other places of burial. In such cases delay or inconvenience is sometimes experienced for lack of the necessary information relating to the death, particularly when bodies are sent by express, and only the name of the consignee and place of destination can be ascertained. To obviate this

difficulty the following form which we use for such purposes is respectfully submitted:

☞ The permit must be obtained in every case previous to the passage of the body into the City of New York.

APPLICATION FOR A TRANSIT PERMIT

FROM BUREAU OF RECORDS OF VITAL STATISTICS, HEALTH DEPARTMENT OF THE CITY OF NEW YORK.

Permission is desired to pass through the city the remains of

Name..... *Age*.....

Occupation.....

Place and Date of Death.....

Cause of Death.....*Place of Birth*.....

Now at.....*(Arrived by what route)*.....

For interment at.....*(By what route)*.....

How certified. (*Name of Medical Attendant*).....

Name and Address of Applicant, ...

NEW YORK, (date).....187 .

This model is submitted for the purpose of suggesting to the different boards of health and physicians throughout the United States the adoption of some uniform plan in such instances. In cases of sudden death, or death from violence, injury, or accident, a coroner's certificate is deemed requisite unless the Health Board permit is presented, one of which should always accompany the body. One reason for being so exact in demanding that the applications for a transit permit shall be accurately filled up is, that in their enabling us to detect the cause of death, those bodies which might jeopardize the health of this city would not be permitted to enter. We also require to be satisfied that proper investigations have been made in cases of sudden death, death from violence, injury, or accident, the name and address of the applicant being a voucher for its correctness. The register of bodies in transit contains all the principal items that could be ascertained at the time, and which might be means of future identification.

Disinterments.

In consequence of the growing increase in population, and the improvements made in this city in laying out streets, avenues, etc., several

cemeteries which existed within the city limits have been obliged to have their bodies disinterred and removed to other burial grounds. The number of permits issued for this purpose for the past twelve months amounted to 261.

Marriage Registration.

There were 7,985 city marriages recorded in this Bureau during the last twelve months. Notwithstanding this subject has been fully and ably discussed in the previous annual reports of the Board, and the beneficial results of an accurate record clearly proven, it is singular to perceive that the diminution in the number of marriage certificates received by this Bureau has been 710 compared with the twelve months of 1869, although an increase of 1,059 over the corresponding period of 1868. The reason for this discrepancy in the returns it is impossible to explain satisfactorily. It is needless to state that every facility has been offered by this Department to clergymen and others duly authorized to solemnize marriages. A registry and envelopes have been furnished free of charge upon application, or sent by mail when requested to any location within the city limits, and any information pertaining to this Bureau cheerfully furnished when desired. The registration law during the existence of the Metropolitan Board of Health was never enforced (as I understand that in no instance had any penalty been imposed for non-compliance), the return was therefore regarded by the majority of the clergymen, etc., as being entirely voluntary.

The marriage law requires a return to be made within ten days after solemnization to this department, but this section has been almost entirely disregarded or neglected, some certificates not arriving until twelve or fourteen months, and even longer, after the marriage ceremony had taken place. Since the creation of the new Board a determination has been evinced to have its laws respected. This Bureau, acting under instructions, made a weekly report to the Board, containing a list of delinquent clergymen and physicians, and prosecutions have promptly followed. This enforcement of the law has proved very successful, as there has been a considerable increase in the returns during the last quarter over the corresponding quarter of 1869; moreover the certificates are now received more expeditiously, and with greater regularity than heretofore. But as yet there are several ministers, of

various denominations in this city, who do not comply with the law, and who fail altogether in sending the returns of marriages solemnized by them. These gentlemen I am sure can assign no substantial reason for their neglect, neither can they find anything objectionable or onerous in the marriage act. The accompanying table will give the total number of marriages on record in this Bureau.

TABLE SHOWING THE NUMBER OF MARRIAGES ON RECORD FOR EACH YEAR, AND THE GRAND TOTAL REGISTERED IN THIS BUREAU.

YEARS.	NUMBER OF MARRIAGES RECORDED.	YEARS	NUMBER OF MARRIAGES RECORDED.	YEARS.	NUMBER OF MARRIAGES RECORDED.
1822	1	1847	338	1859	3,149
1834	1	1848	440	1860	4,058
1835	1	1849	13	1861	2,846
1838	1	1850	10	1862	2,909
1839	1	1851	14	1863	3,218
1840	1	1852	37	1864	3,223
1841	3	1853	3,301	1865	2,816
1842	42	1854	5,515	1866*	5,722
1843	6	1855	3,996	1867	7,513
1844	1	1856	3,763	1868	6,926
1845	3	1857	3,999	1869	8,695
1846	4	1858	3,595	1870	7,955
Total number of marriages recorded					84,245

The following abstract will epitomize and give all the necessary particulars connected with the marriage registration for the twelve months ending December 31, 1870.

* Year of organization of Board of Health.

Abstract of the Registry of Marriages in the City of New York for the Twelve Months ending December 3 1870.

1870.	Total.	Color.				Nativity.								Condition.									
		White.		Black.		Foreign.		Native.		Born at Sea.		Not Stated.		First Marriage.		Second Marriage.		Third Marriage.		Fourth Marriage.		Not Stated.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
January	717	703	703	14	14	460	415	211	258	.....	.....	46	44	614	598	73	83	3	.....	.....	.....	27	36
February	580	567	567	13	13	381	357	195	219	.....	.....	4	4	472	484	80	72	4	1	.....	.....	24	23
March	734	720	720	14	14	514	436	176	252	.....	1	44	45	555	548	103	83	2	5	.....	.....	74	98
April	500	494	494	6	6	334	301	158	194	.....	.....	8	5	398	403	70	61	1	1	.....	.....	31	35
May	702	692	693	10	9	501	451	184	235	1	.....	16	16	568	575	84	68	3	1	.....	.....	47	58
June	804	795	795	9	9	562	490	198	270	.....	.....	44	44	669	681	112	96	1	1	1	.....	21	26
July	590	585	586	5	4	421	376	164	211	.....	.....	5	3	483	495	87	75	8	1	.....	.....	12	19
August	538	534	534	4	4	409	382	125	153	.....	.....	4	3	442	441	80	82	9	1	.....	.....	7	14
September	628	620	620	8	8	405	362	197	241	.....	.....	26	25	530	528	83	81	8	.....	1	.....	6	19
October	662	656	656	6	6	447	383	205	267	.....	.....	10	12	563	604	78	30	9	4	.....	.....	12	24
November	1,049	1,030	1,030	19	19	735	634	287	388	1	.....	26	27	836	848	133	119	13	3	.....	.....	67	79
December	481	474	474	7	7	302	261	170	212	.....	.....	9	8	392	399	64	57	3	1	.....	.....	22	24
Total	7,985	7,870	7,872	115	113	5,471	4,848	2,270	2,900	2	1	242	236	6,522	6,604	1,047	907	64	19	2	.....	350	455

Ages of Persons Married.

AGES.

1870.	Under 20.		20 to 25.		25 to 30.		30 to 35.		35 to 40.		40 to 45.		45 to 50.		50 to 55.		55 to 60.		60 to 65.		65 to 70.		70 to 80.		80 to 90.		Not Stated.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
January	3	121	212	207	256	173	114	56	66	31	25	15	11	3	13	4	1	1	1	1	1	...					11	15
February	5	104	154	240	203	127	96	50	49	27	33	14	12	5	12	2	4	....	3	....	....	....					8	11
March	2	117	208	230	261	152	125	60	40	28	31	8	17	9	9	2	5	2	....	....	2	1	3	....	1		10	35
April	3	80	121	214	212	114	73	44	36	10	16	11	13	6	6	3	2	1	1	....	1	...	..	...	....		15	17
May	3	101	182	203	276	163	108	64	58	25	27	13	16	7	10	3	2	....	1	....	....	....		...	....		18	26
June	5	117	194	228	216	209	142	75	65	33	28	24	16	7	14	3	5	1	1	....	....	...	..		..		8	7
July	1	15	160	240	206	159	101	52	51	22	22	15	17	7	8	1	5	1	2	1	1	...			..		5	8
August	7	87	142	206	183	127	90	59	59	23	24	16	18	3	6	5	3	1	2	....	....	...	3		..			1
September	5	101	156	264	234	162	103	46	56	27	20	15	16	9	8	2	4	...	3	1	2	...	..		..		2	1
October	5	125	196	208	231	134	123	51	41	23	21	15	19	6	7	1	7	...	1	....	3	...	..		..		6	7
November	20	257	338	414	272	203	116	69	69	39	42	21	21	4	16	1	8	...	3	2	1	...	..		..		40	20
December	12	124	176	194	134	94	72	32	29	15	27	6	13	2	4	2	1	....	....	....	1	...	..		..		10	10
Total	71	1,419	2,371	3,398	2,805	1,816	1,365	656	601	323	347	175	188	70	115	29	47	7	16	5	12	1	10	....	1	....	154	174

Tables showing the number of Marriages and Births returned to this Bureau quarterly for the past four years.

MARRIAGES.

	1867.	1868.	1869.	1870.	TOTAL.
First Quarter—January, February, March.....	1,567	1,585	1,878	2,031	7,056
Second Quarter—April, May, June.....	2,129	1,994	2,424	2,006	8,553
Third Quarter—July, August, September.....	1,755	1,692	2,262	1,756	7,465
Fourth Quarter—October, November, December..	1,655	1,655	2,136	2,192	7,638
Totals.....	7,106	6,926	8,695	7,985	30,712

BIRTHS.

	1867.	1868.	1869.	1870.	TOTAL.
First Quarter—January, February, March.....	3,317	3,337	3,739	3,850	14,243
Second Quarter—April, May, June.....	2,946	2,880	2,833	3,239	11,848
Third Quarter—July, August, September.....	3,429	3,367	3,850	3,548	14,194
Fourth Quarter—October, November, December..	3,139	3,056	3,525	3,887	13,606
Totals.....	12,830	12,590	13,947	14,524	53,891

The registration of births presents a more favorable aspect than that of marriages, there having been 14,524 names of living infants recorded during the last twelve months, an increase over the corresponding period of 1869 of 577, and over that of 1868 of 1,934. Although this augmentation is quite satisfactory, yet by no means are the returns to be relied upon as being even an approximation to the actual number of births which have taken place during this period. The system of registration has been considered almost entirely voluntary, and as a consequence has not approached the expected standard; the number of births reported never having exceeded the deaths since the existence of the registration law.

Abstract of the Registry of Births in the City of New York for the Twelve Months ending December 31, 1870.

MONTHS.	TOTAL.	COLOR.			SEX.			NATIVITY OF PARENTS.								NAME OF CHILD.	
		White.	Colored.	Not stated.	Male.	Female.	Not stated.	Foreign.	Native.	Foreign Father only.	Foreign Mother only.	Nativity of Father stated only		Nativity of Mother stated only		Not stated.	Stated.	Not stated.
												Native.	Foreign.	Native.	Foreign.			
January	1,254	1,238	15	1	634	618	2	848	315	68	40	.....	1	5	41	2	880	374
February	1,221	1,205	15	1	608	612	1	814	176	93	57	.....	2	9	43	1	874	347
March	1,375	1,358	17	..	675	696	4	960	210	123	46	.....	4	8	80	1	1,040	335
Total (first quarter)	3,850	3,801	47	2	1,917	1,926	7	2,622	601	314	153	.....	8	17	133	4	2,853	997
April	1,067	1,057	10	..	526	470	1	705	177	94	87	.....	3	1	40	2	723	335
May	1,093	1,080	12	..	515	500	27	690	179	105	70	2	1	10	17	..	700	393
June	1,080	1,063	17	..	555	524	1	700	186	95	47	.....	.....	6	45	1	745	335
Total (second quarter)	3,239	3,200	39	..	1,716	1,494	29	2,104	542	294	163	2	3	17	111	3	2,167	979
July	1,139	1,130	9	..	598	540	1	711	255	98	50	.....	.....	10	4	5	833	307
August	1,405	1,390	15	..	700	699	6	875	206	139	67	.....	2	6	17	3	1,081	319
September	1,004	989	15	..	558	442	4	670	180	87	56	.....	.....	2	7	..	276	728
Total (third quarter)	3,548	3,509	39	..	1,856	1,681	11	2,256	741	314	173	.....	2	25	28	8	2,201	1,347
October	1,295	1,277	8	..	668	613	4	996	155	132	64	.....	.....	5	10	3	915	380
November	1,095	1,065	20	..	573	509	3	662	204	135	64	.....	4	2	6	3	641	444
December	1,517	1,501	16	..	830	687	..	702	310	280	213	.....	.....	2	9	..	1,100	427
Total (fourth quarter)	3,907	3,843	44	..	2,071	1,809	7	2,360	669	547	341	.....	4	16	25	5	2,656	1,251
Total for the year	14,544	14,353	169	2	7,560	6,910	54	9,382	2,553	1,459	830	2	17	75	286	20	9,987	4,557

To the greater portion of the medical profession (both allopathic and homœopathic), with the co-operation of the licensed and accredited European midwives, we are indebted for the promptness and alacrity that have been displayed in forwarding those that have been received the past year, and the growing interest in the success of the Bureau and this important branch of registration.

The births of males were 261 in excess of females, and as usual the children of foreign parentage greatly preponderated. The accompanying abstract presents an analysis of the principal important facts connected with the past year's birth registration, and the subjoined table represents the number of children borne by each mother during the same period. I also beg leave to insert the total number of births recorded for each year, and the grand total since the existence of the law.

TABLE SHOWING THE NUMBER OF CHILDREN BORNE BY EACH MOTHER, AS COLLECTED FROM THE RETURNS OF BIRTHS RECEIVED IN THIS BUREAU FOR THE TWELVE MONTHS ENDING DECEMBER 31, 1870.

PARENTAGE.	1	2	3	4	5	6	7	8
Native	905	604	413	231	172	96	81	49
Foreign	1,872	1,221	1,101	814	522	448	302	251
Not reported	15	1	1	1	3	1	.....	.....
At sea	1	.....	.....	.....	.....	.....	.....	.....
Total stated	2,793	1,826	1,515	1,046	697	545	383	300

PARENTAGE.	9	10	11	12	13	14	15	16	17	18	NOT STATED.
Native	21	18	12	4	1	2	1	....	....	1	1,156
Foreign	158	85	52	28	12	6	4	2	3	1	3,852
Not reported	.....	.....	....	....	....	....	....	....	....	....	.....
At sea	.....	.....	....	....	....	....	....	....	....	....	.....
											5,008
Total stated	179	103	64	32	13	8	5	2	3	2	9,516
Total number of births reported	.....	.....	....	....	....	....	....	....	....	....	14,524

TABLE SHOWING THE NUMBER OF BIRTHS ON RECORD FOR EACH YEAR, AND THE GRAND TOTAL REGISTERED IN THIS BUREAU (NOT INCLUDING STILL-BIRTHS.)

YEARS.	TOTAL.	MALE.	FEMALE.	SEX UNKNOWN.	WHITE.	COLORED.	NOT STATED.
1830	1	.....	1	.....	1	.....	.....
1832	1	.....	1	.....	1	.....	.....
1834	1	.....	1	.....	1	.....	.....
1835	1	.....	1	.....	1	.....	.....
1839	2	2	.....	.....	2	.....	.....
1846	1	1	.....	.....	1	.....	.....
1847	1	1	.....	.....	1	.....	.....
1848	2	2	.....	.....	2	.....	.....
1851	5	3	2	.....	5	.....	.....
1853	9,287	4,899	4,379	9	9,174	112	1
1854	17,076	8,816	8,246	14	16,858	218	.....
1855	13,371	6,961	6,399	11	13,210	161	.....
1856	15,603	8,182	7,400	21	15,417	186	.....
1857	17,680	9,063	8,602	15	17,558	122	.....
1858	12,132	6,380	5,739	13	12,069	63	.....
1859	8,128	4,219	3,880	20	8,080	48	.....
1860	5,998	3,154	2,833	11	5,961	37	.....
1861	9,869	5,072	4,748	49	9,798	71	.....
1862	7,633	3,927	3,693	13	7,607	26	.....
1863	6,373	3,287	3,071	15	6,335	38	.....
1864	5,689	2,968	2,708	13	5,661	28	.....
1865	111	61	50	.....	111	.....	.....
1866	*10,117	5,202	4,905	10	10,025	87	5
1867	12,569	6,397	6,164	8	12,405	164	.....
1868	12,672	6,531	6,136	5	12,564	108	.....
1869	13,947	7,096	6,835	16	13,755	192	.....
1870	14,524	7,560	6,910	54	14,353	169	3
Total	192,794	99,784	92,713	297	190,956	1,830	8

The voluntary system having been tried since the establishment of the registration laws, and the success anticipated not having been realized, the Board has recently been obliged to resort to compulsory legal means to insure the same thoroughness and completeness as have characterized the returns of deaths (which are above comment). It has commenced by prosecuting tardy clergymen, physicians, and midwives who failed to send in their returns within ten days, and also those omitting to report when information thereof has been brought to the knowledge of this Bureau. The following suggestion, relative to the returns of certificates of marriages, I think would, if adopted, tend to augment this branch of statistics, and also would undoubtedly be of assistance to the different clergymen, etc., viz.: to have an inspection of the marriage registers belonging to clergymen and other persons duly authorized to solemnize marriages in New York City, made every ten

* Year of organization of the Board of Health.

days, or as often as practicable, whose object would be to collect the certificates and carefully examine and compare the number reported to this Bureau, and in case of any deficiency, the penalty should be exacted for each individual failure to report.

To procure anything approaching a correct statement of the yearly number of births in this city, would require almost a constant house-to-house inquiry and visitation, which would seem absolutely necessary on account of the number of women that are attended during accouchment by uneducated persons, who may be entirely ignorant of the law, or not capable of filling the required certificate. The means lately suggested by the Reg'r would also be of great assistance in discovering negligent obstetricians. The certificates of deaths of infants (whose ages are stated thereon) might be compared with the Birth Register, and if a delinquency existed it could be detected with facility.

The law states that it shall be the duty of the parents, and holds all persons present at a birth liable to a fine if a written report is not made within ten days, containing the date, ward, and street number of said birth as far as known. On each of the blank returns issued from this Bureau, a notice is printed calling attention to the above extract from the statutes, and also stating that the law will be rigidly enforced as regards the medical attendant and parents. Under these circumstances, the name of the medical attendant could be obtained without difficulty, as the parents would be parties to the suit in case of non-disclosure.

The registration of marriages and births, on account of its incompleteness, has frequently given rise to unfavorable comment both by the public press and the law-abiding portion of the clerical as well as the medical profession, who constantly dilate upon the beneficial effects of registration, and who do not appear to understand the reasons or objections their confreres have for not reporting, and who unhesitatingly assert that as other means have failed, compulsory measures should be resorted to. An excellent plan would be the imposition of a penalty according to the degree of aggravation of offence, whether the first, second, third, etc., and the offer of a reward of half the penalty above costs (when collected) to the informer on persons omitting to make their returns, notice of such a reward to be advertised in the newspapers or by posters annually.

Still-Births.

There were 2,254 dead-born infants registered in this Bureau, from January 1 to December 31, 1870, and which are not included in the "consolidated abstract of deaths" for this period. This is an increase of 39 over the corresponding period of last year, and of 59 over that of 1868, the greatest number having occurred at the ninth month of fœtal existence. The principal causes assigned, were dystocia, prolapse of the funis, constitutional disease of parents, accidents, malformation of pelvis, debility, etc. A number of these deaths may be attributed to uneducated midwives and incompetent medical attendants, and also to the use of the many nostrums which are daily advertised in several newspapers with impunity for special purpose.

The accompanying abstract will give a complete synopsis of the returns of still-born infants to this Bureau for the year 1870.

All of which is respectfully submitted by

Your obedient servant,

JOHN T. NAGLE, M.D.,
Deputy Reg'r of Records.

RETURN OF STILL-BIRTHS,

Showing the Nativity of Parents, and the Period of Utero-gestation, for the Twelve months ending December 31, 1870.

Months.	Total.	Sex.			Nativity of						Period of Utero-gestation.										
					Father.			Mother.													
		Male.	Female.	Not stated.	Native.	Foreign.	Not stated.	Native.	Foreign.	Not stated.	First month.	Second month.	Third month.	Fourth month.	Fifth month.	Sixth month.	Seventh month.	Eighth month.	Ninth month.	Tenth month.	Not stated.
January	195	125	69	1	31	142	22	36	146	13	1	....	....	5	10	23	27	22	89	....	18
February	209	119	85	5	36	152	21	49	145	15	....	....	1	3	10	18	30	26	88	3	30
March	199	111	83	5	34	146	19	39	148	12	....	....	2	4	9	14	28	25	101	1	15
Total (1st Quarter)...	603	355	237	11	101	440	62	124	439	40	1	....	3	12	29	55	85	73	278	4	63
April	186	107	74	5	33	136	17	41	131	14	....	....	....	8	8	9	22	23	92	2	23
May	185	104	81	.....	34	134	17	46	123	16	....	....	2	3	18	17	26	21	80	1	17
June	201	111	87	3	39	133	29	45	135	21	....	....	2	4	8	23	17	31	98	....	18
Total (2d Quarter)....	572	322	242	8	106	403	63	132	389	51	....	....	4	15	34	49	65	74	270	3	58
July	184	98	84	2	26	144	14	28	141	15	1	1	1	2	10	17	25	22	92	1	12
August	159	96	63	.....	26	123	10	30	125	4	....	....	1	3	10	12	23	24	73	....	13
September	182	97	84	1	33	130	19	33	135	14	....	....	1	4	8	24	27	16	16	....	13
Total (3d Quarter)....	525	291	231	3	85	397	43	91	401	33	1	1	3	9	28	53	75	62	181	1	38
October	192	108	83	1	41	139	12	46	135	11	....	1	2	2	7	23	31	23	90	....	13
November	176	103	73	.....	37	127	12	42	124	10	....	....	....	5	10	22	36	18	78	1	6
December	186	105	81	.....	31	144	11	44	135	7	....	....	2	8	6	29	27	25	80	....	9
Total (4th Quarter)...	554	316	237	1	109	410	35	132	394	28	....	1	4	15	23	74	94	66	248	1	28
Total for the year....	2,254	1,284	947	23	401	1,650	203	479	1,623	152	2	2	14	51	114	231	319	275	977	9	187

"E."

REPORT OF THE ATTORNEY AND COUNSEL.

COL. EMMONS CLARK, *Secretary, etc.*

DEAR SIR—In compliance with the regulations of the Board of Health, I submit herewith a report of all suits and legal proceedings instituted in behalf of the Department during the year following its organization.

The following summary will show the volume and character of the business transacted:

Number of actions commenced		2,576
Classified as follows:		
For non-compliance with the orders of the Board	1,562	
For violations of the Tenement-house Act	713	
For violations of sanitary ordinances	301	
		2,576
Of this number there are now pending	700	
Discontinued without the payment of costs	322	
Discontinued upon the payment of costs	822	
Tried and judgment rendered for plaintiff	706	
Judgments of dismissal or nonsuit	23	
Abated by death of defendants	3	
		2,576

DISPOSITION OF JUDGMENTS.

Total number of judgments		706
Settled on payment of some portion of amount	177	
Settled without payment of any portion thereof	47	
Now in force	482	
		706

Amount realized in settlement of actions and deposited to the credit of the Health Department $10,010 75

It has been my aim, as far as practicable, to avoid delay in the legal proceedings adopted by the Board to enforce its authority; with this view the suits have been apportioned between the courts of the Third and Sixth judicial districts of the city, and I have thereby been enabled to keep pace with the demands of the Board. In all cases of discontinuance or settlement of suits, compliance with the order, ordinance, or law upon which the proceeding was based has been made a condition precedent. By this method the collection of but a small percentage of the penalty incurred has not been attended with the diminution or sacrifice of a proper respect for the authority of the Board. In a large majority of instances the defendant has faithfully discharged the condition imposed, and there have been comparatively few attempts to evade or ignore the terms of settlement.

The doubt formerly existing as to the enacting power of the Health Department, with reference to ordinances adopted in the interests of sanitary reform, was finally settled by the law creating the present Board and defining its powers; nor do I anticipate any successful or determined resistance to its authority wisely exercised in the suppression of nuisances, or the regulation or discontinuance of offensive and unwholesome trades. It is perhaps noteworthy that the vigorous measures of the Board to secure prompt reports of births, marriages, deaths, and of the presence of contagious or infectious disease, as provided by its ordinances and the law of the State, have been quite successful. Section 110 of the Sanitary Code, which became operative on and after June 1, 1870, has been extensively enforced. Under its salutary operation all manufacturing establishments in the city are required to consume the smoke arising from their furnaces, thus sensibly abating an evil formerly regarded as incurable.

The spirit of accommodation and co-operation uniformly manifested by the presiding justices of the courts to which the Department has resorted deserves commendation. To their promptitude and industry the successful administration of the Department is mainly due. After a short trial, I became satisfied that the transaction of the legal business of the Board at an office remote from the other bureaus of the Department was attended with delays, misunderstandings, and considerable inconvenience; accordingly, the records and papers in my possession were transferred to the building occupied by the Department, where as much

of the business is at present conducted as can be done with due regard to the convenience of parties.

With this brief review of the operations of the Legal Bureau, and congratulating the Board upon the substantial reforms it has secured, the foregoing statement is respectfully submitted.

A. J. VANDERPOEL,
Attorney and Counsel for the Board of Health.

NEW YORK, April 12, 1871.

"F."

REPORT OF THE ENGINEER.

HEALTH DEPARTMENT,
ENGINEER'S OFFICE,
NEW YORK, March 13, 1871.

To COL. EMMONS CLARK, *Secretary, etc.*

SIR—In submitting this my first report upon the termination of the year, it is proper to refer to the circumstance that I did not enter upon the duties of this office until the 1st of November last, and that, consequently, I have had but a brief period wherein to make observations for, and to collect elements for the consideration of the Department.

The late engineer to the Metropolitan Board of Health, Mr. W. E. Worthen, having made very full reports, accompanied with recommendations concerning the matters under his official notice and control, and which reports being now transferrod to, and in the possession of this Department, any detailed or extended reference by me to the subjects treated of, could be but little else than a repetition of that which the Department is well advised of. I have, therefore, to confine myself to a report of my own operations, and to a reference to such matters as seem to me worthy of your further consideration, accompanied with my individual views thereon.

The several complaints arising from insufficient drainage and sewerage, and arrested sewage, which have been referred to me, have received my attention and action; and, under the direction of the Sanitary Committee, I have visited the institutions of the Deaf and Dumb, the Lunatic Asylum at Bloomingdale, the Orphan Asylum, and the House of Mercy, and made reports thereon regarding the drainage and sewerage.

The several matters which I have to submit to your consideration are as follows:

VENTILATION.

The ventilation of tenement houses is duly provided for in the Sanitary Code, adopted May 18, 1870; and under its requirements, and those of preceding acts, many and very beneficial results have been effected and are insured by an adherence to their provisions. Public schools are duly provided for, by the Commissioners thereof, under whose sole control they are constructed and regulated; but in the case of theatres, corporate or private schools, church lecture rooms, and public halls, however, I am of the opinion that there exists an extensive field for the interposition of the Department, and in support of this I have but to refer to the very full reports of Dr. R. C. Stiles and Engineer W. E. Worthen, on the "sources of unhealthfulness in crowded assemblies and places of popular amusement and resort" (p. 390, 1869), and as a method of bringing this important subject fully and practically before the Department, I recommend that the Sanitary Inspectors be directed to visit all such structures within their respective districts and to report thereon.

MARKETS.

Of the condition of the public markets of this city I am at a loss to present them to you with the fulness and with the force they deserve. Jefferson, Clinton, Centre, Fulton and Washington, from the insufficiency of their areas, compared with their occupancy, in the enclosure of the sidewalks, in the decayed condition of and absence of ventilation of the cellars, in their insufficient sewerage, and in the total neglect of their proper ventilation, cannot be otherwise than fruitful sources of ill-health to their occupants; added to which this condition can but be well suited to locate and to foster an epidemic approaching them in its course.

Washington Market presents an extreme case; the business that centres there is of such magnitude that its area is wholly incompatible with its requirements, added to which it is much more difficult to observe the requirements of a sanitary condition in a market where such a vast amount of produce is received, than in one of less dimensions and resort.

The aggregation of vegetable productions there is too immense to be

always or regularly disposed of, and as a consequence, the cupidity of its vendors will induce them to retain it so long as it is practicable for them to do so, and with laxity in the removal and proper disposal of it, putrescence ensues, and noxious exhalations are set free. This market, in its location, is many years behind the requirements of the time; in design it is altogether inadequate to its purpose; in condition it is disgraceful; in the encumbrance and enclosure of the sidewalks of the streets leading to it, and in the blocking up of the streets with the wares of itinerant pedlers, it is almost impracticable to reach it, and when reached, the insufficiency of its thoroughfares is so great that it is next to an impracticability to pass through it; and how it is that the citizens of this city have so long endured the nuisance of this market, I am at a loss to explain.

CESSPOOLS.

Constructions of this character, without being trapped, except for surface water alone, should be avoided as far as practicable, inasmuch as they are but deposits of filthy water, the evaporations from which are necessarily injurious to the surrounding area, and where there is no sewer with which they can be conveniently connected, it would be better to provide for the flow of the waste and slops of a dwelling into the street gutters than to arrest and confine it in a cesspool.

DRAINAGE.

This important subject is treated of in a preceding report, made under authority of a resolution of the Department, in October last.

SEWERS.

A judicious and effective system of sewers is the basis of a proper sanitary condition of a populous city, and in a city situated alike to this there are presented great natural advantages, which, as yet, it is to be regretted, have not been as fully availed of as a due regard to the health of our citizens requires, and as a digested system of sewerage would have developed.

The leading element of insufficiency of the existing plan in a sanitary point, is that of the discharge of the sewage at the bulkheads at the head of slips, instead of at the ends of the piers, whereby fecal and vegetable matter in suspension, would be borne off by the tidal cur-

rents, instead of being deposited at the head of the slips to impregnate the air with offensive effluvia.

This latter system, however, of the discharge of the sewage of this city, is not the proper one, in my opinion, but is preferable only as being less objectionable than the existing system.

The sewage of a populous city should be received, either into a basin at the terminus of each sewer, or into a line of riparian sewers encircling the city and having basins or receptacles at intervals of a quarter of a mile or less, from which the sewage could be discharged into fitting receptacles, deodorized, and from them transported for utilization in agriculture. Any system of riparian sewerage having but one or two common receptacles or embouchures is impracticable from the insufficiency of inclination of depression, consequent upon so great a base, with so small a depression.

DEPRESSION OF GUTTER-STONES.

Irregularities from depression of the gutter-stones of streets involve the arrest of the flow of surface-water, and consequently when there are not proper sewer-connections to the houses, the dwellers therein are subjected to the noxious exhalations of pools of stagnant and filthy fluids.

It occurs that a great number of tenements are deficient in connection with a street sewer, thereby involving the discharge of slops, which are frequently mixed with fecal matter, into the street gutters. This operation is one so opposed to a due regard to the health of our citizens, independent of other consequences, that I submit to your consideration the propriety of an enactment whereby it will be made imperative upon the owners of all houses to connect them with a sewer, provided that there is one in front of or adjacent to their premises.

WATER-CLOSETS AND URINALS.

Of the propriety of the erection of public water-closets and urinals, there cannot, in my opinion, be any difference of views, the only question being where and in what manner shall they be located and constructed, and as they are especially required upon our river fronts, I suggest that the matter be laid before the Departments of Docks and Public Works with a view to ascertain if, in the contemplated design

of piers, the former Department has considered the subject, and if the latter Department purpose to proceed in this matter.

As regards the plan of their construction, this is a matter that can be better considered whenever it may become necessary to design them.

ILLUMINATING-GAS MANUFACTURE.

Under the requirements of the Department, the hitherto process of purifying gas, whereby the sulphurous compounds were set free in the air, and also the practice of discharging the noxious residuum of that process, or "blue billy," as it is termed, into our sewers and rivers, have been set aside, and the nuisances thereof essentially abated.

The escape of the products of combustion, however, from such extensive and continuous operations as are necessary in the manufacture of illuminating or coal gas for such a numerous population as that of this city, and which operations have become so immense, render it very questionable if they should be permitted within the occupied portions of a city, unless proper precautions were had, whereby the escape of all the products should be rendered innoxious and inodorous.

CELLARS.

There are many cellars which, from being located upon the river fronts, or in the course of Canal street, East Broadway and Centre street, are excavated to a depth below the high-water line, and, as a consequence, when they are not floored and walled in such a manner as to resist the flow of water into them, they are frequently flooded and always damp. In the default of rendering such places water-tight, and in the absence of a sewer at the river front, designed for such purpose, they should be compactly filled in with fresh earth.

LOW LOTS AND STAGNANT WATER.

The opening of streets, as it is termed, which in very many cases is quite the reverse in fact, involves the filling in of all ground of an elevation inferior to the grade of the street, and the effect of such filling is to dam or inclose the surface water of the contiguous lots, and when this occurs, without proper provisions for its being led off by drains to a sewer, or a culvert under the street, stagnant water is the

result, which is an element so pregnant with disease, that I recommend, *in the absence of the enactment of a law regarding a digested and uniform system of drainage*, that all premises, which from their natural face or by the embankment of streets, are so much below the grade of the streets bounding them as to involve the arrest of the flow of surface water therefrom, be forthwith filled to a proper level.

STREETS AND SIDEWALKS.

Under the provisions of the act creating the Health Department, it has authority to cause the removal of any obstructions of a street or sidewalk involving danger to life or detrimental to health, and I submit to the Department if the occupancy of the streets and sidewalks to the extent in practice in this city, is not only dangerous to life and limb, but that it has proved so in numerous instances.

If the grievous nuisance of these obstructions is to be permitted, I suggest that some order be taken toward its amelioration; thus, if a party is to be allowed to have several wagons deposited in front of his and his neighbors' premises, it is not necessary that their shafts should be so set as to project out into the street, at the risk of impaling all who pass by them. If the owners of trucks or carts are allowed to deposit them in the street, it is not necessary that they should be set several feet without the curb, or that two should be set abreast of each other, thus reducing the effective width of the street to a very inconvenient and dangerous extent; neither is it necessary that the approaches to a market should be rendered dangerous to life and limb by the occupancy of the streets and sidewalks, with an exposure of articles in nowise connected with, or necessary to the purpose of a provision market; or that, with a like danger, the trade and commerce of this city should be impeded and restricted by the delay in the transit of merchandise consequent upon the obstruction of West and South streets by fruit, coffee, and oyster stands.

WOODEN PAVEMENT.

Wood in its ordinary condition when used for pavements is subject to decay and the destruction of its fibres by the crushing effect of loaded vehicles and horses, as it is altogether too porous in its structure for endurance of such wear, and by the crushing of its fibres its decay is fa-

cilitated; for if it is seasoned, the abrasion of its surface exposes it the more readily to alternations of moisture and dryness, and if it is unseasoned, the coating of its surface with coal tar or any like substance, by retaining the fluids, hastens its decay.

There is a common, but fallacious idea, that the charring of unseasoned timber, as is usually practised in setting fence-posts, etc., preserves it; on the contrary, the charring, painting, or coating of unseasoned timber hastens its decay. Further, if the wood is seasoned, it is subject to *common rot* from its alternate exposure to moisture and dryness, and if it is unseasoned, it is subject to *dry rot* by the putrefaction of its vegetable albumen and fermentable elements.

I am of the opinion, therefore:

1st—That wood in its ordinary condition is unsuited as a material of pavement.

2d—That the wooden pavement now being laid in this city will not meet the demands of the public in relation to health, its economy of maintenance, and endurance to wear.

3d—That wood, from the porosity of its structure, is altogether unsuited for the requirements of a pavement, unless its contained albumen has been solidified, its fluids expelled, and its pores filled with an antiseptic or oleaginous liquid of such consistency as will retain its condition, and, consequently, the paving of the streets of a city with wood unprepared to resist the early decay consequent upon its frequent exposure to moisture and dryness, is simply providing an easy transit for vehicles for a brief period, to be followed by the germination and the fostering of disease by the exhalations therefrom.

TENEMENT HOUSES.

The reports to the Department regarding tenement houses have been so full and so numerous that it is altogether unnecessary for me to enter into any details regarding them. The salutary and sanitary powers delegated to the Department have been well exercised, and great benefits have ensued therefrom. It is to be regretted, however, that the powers of the Department do not extend to the design of these buildings, in a restriction as to the number of the rooms and to the height of them, for in just proportion with the height of them, that is, with the number of floors above each other, will the unsanitary results consequent

upon an aggregation of families ensue, despite a due observance of the requisites of proportional ratio of room for each inmate, and the manner or absence of ventilation now imposed by law.

I have the honor to be,

Very respectfully, yours, etc.,

CHAS. H. HASWELL,
Engineer.

"G."

REPORT OF THE CHEMIST.

Col. Emmons Clark,

Secretary Health Department City of New York:

Sir—I have the honor to make the following report of the subjects which have engaged my attention as Chemist to the Department during the past year.

THE GAS NUISANCE.

All the gas companies on the Island are now using improved methods of purification, by which the *gas nuisance*, so long a subject of complaint, and which received formerly so much attention from the officers of the Board of Health, is practically abated. The New York Gas-light Company, which lights that portion of the city situated below Grand street, employs at the works on East Twenty-first street the improved *iron ore process* of St. John & Cartwright. It is very effective, and the material, during its regeneration in the atmosphere, does not evolve any offensive odors.

The Manhattan Company, which supplies gas to the section of the Island included between Grand and Thirty-fourth streets, employs at the two stations on East Fourteenth and West Eighteenth streets the *dry lime process*, combined with a ventilating system by which the foul lime is deodorized before it is exposed to the air. At rare intervals complaints have been made of offensive odors issuing from the Eighteenth street works, but whenever I have visited them, I have failed to detect any cause of complaint. The ammonia factory opposite the works has at times been offensive, evolving odors which may readily be mistaken for those of foul lime. The proprietors promised, however, to introduce a washing apparatus, by which the foul odors

would be absorbed and prevented from escaping into the atmosphere.

The Metropolitan Gas-light Company, which supplies the district between Thirty-fourth and Seventy-ninth streets, is using the *Laming process*, which is very efficacious, and not in the least objectionable.

The Harlem Company, which supplies all that portion of the Island situated above Seventy-ninth street, employs the *iron ore process* of St. John & Cartwright, with the addition of a tray of dry lime in each purifier, as a means of removing the small quantity of carbonic acid in the gas. This lime is made on the premises from oyster shells. Owing to a disarrangement of the smoke-consuming apparatus, connected with the kiln, the process became offensive during the past summer. The officers of the company were notified of the just cause of complaint which thus arose, and I presume the defects were remedied.

During the past few months works have been erected by a new company at the foot of East Twelfth street, of considerable magnitude. I have visited them several times, but have been unfortunate in not meeting any of the officers of the company. I do not therefore know what process of purification is to be adopted there. It will be well to communicate with the directors of the company and to call their attention to the elaborate study of the subject which was made by direction of the Board of Health, and which is recorded in the annual report for 1869. It may thus be possible to prevent a disagreeable controversy, which must sooner or later arise should the *dry lime* process of purification be adopted, without any special provisions to avoid creating the offensive nuisance which formerly caused so much complaint against the companies.

DANGEROUS KEROSENE.

This subject has been a constant study. The accidents caused by unsafe oils steadily increase in number, but at the present moment there is no law on the statute book under which the venders can be reached.

In 1869 Fire Marshal Brackett reported ninety-eight fires in the city, caused by poor kerosene and naphtha oils; or eleven per cent. of all the fires.

There came to my knowledge, by the ordinary channels of two daily

papers, and the usual sources of information, the following list of accidents from poor kerosene and naphtha oils:

	In 1869.	In 1870.
Deaths	52	84
Severe injuries	50	50
Slight injuries	6	11
Total	108	145

The evil is clearly increasing. Early in March one hundred samples of oil were purchased from retail shops in various parts of the city. These were tested, and are classified as follows:

Safe kerosene, not emitting inflammable vapors below 100° F		7
Unsafe kerosene, emitting inflammable vapors below 100° F	85	
Naphtha, sold under false names, emitting inflammable vapors at all temperatures	8	
Total dangerous oils		93
		100

Only seven per cent. of the oils sold in the city are safe.

Several shops have been opened for the sale of naphtha under false names, which are designed to lead persons to select the oil as specially safe.

The most noticeable case of this kind is that of G. M. Danforth & Co., who have their principal office at 953 Broadway, with branch shops in other parts of the city. The oil sold by this firm as "Danforth's Non-explosive Petroleum Fluid," is naphtha—nothing more or less; it is the most dangerous article that can be put into a lamp or brought into a house. It has already caused numerous accidents, some fatal.

There is no excuse or apology for this condition of the kerosene traffic. At the present price of crude petroleum of 14½ cents per gallon, oil that will not emit any inflammable vapors at any temperature below 100° F., can be sold at wholesale in bulk at 27 cents per gallon, and retailed at 35 to 40 cents. At the latter price it costs only one third of one cent an hour to supply a common kerosene lamp of the size generally in use, or one cent each night. At this price the refiner and the dealer would have a fair profit, and I cannot conceive of their willingness to become murderers in order to increase their gains still further. The courts have decided that the Health Depart-

ment has no jurisdiction in this matter; that it belongs to the Fire Commission. They in turn find that the law under which they act does not specify explicitly the quality of oil that shall be considered unsafe, nor the penalties for selling it. An amended law has been sent to Albany, which, if passed and properly enforced, will prove effectual.

The importance of diffusing a thorough knowledge of this subject in all its bearings, was, I suppose, the cause of the resolution of the Health Commissioners, directing the Chemist to prepare "a report in full on the subject of the traffic in dangerous oils." This report is now in course of preparation, and will be presented at an early day.

MILK.

The milk supply of the metropolis has been a subject of special study during the past year. A large number of analyses have been made of both the ordinary and the condensed milk.

The ordinary milk is largely diluted with water, and although nothing injurious is really added, still infants are defrauded of the nourishment which they require and should get from the milk. Much thought has been given to the question of how best to prevent this adulteration, and some suggestions are offered in my special report on this subject.

The condensed milk is found, with few exceptions, to be made of skimmed milk entirely or in part. It is thus robbed of its cream, and is therefore deficient in fat (butter). This really renders it unfit for the nourishment of children, and the fraud is more objectionable than that of diluting the whole milk with water.

Milk is the model food; it contains the four essential varieties of nourishment—

1. The nitrogenous—casein.
2. The amylaceous or saccharine—sugar of milk.
3. The fatty—butter.
4. The saline and earthy—the salts.

Each of these is as necessary as the other. If the milk is robbed of one of them, it is no longer suited to nourish the body.

The following table shows, (1) the composition of good milk of average quality; (2) the same condensed; (3) one of the condensed milks sold in New York:

	PURE MILK.	PURE MILK CONDENSED.	CONDENSED MILK SOLD BY A N. Y. COMPANY.
Casein	4.00	16.00	15.80
Sugar	5.00	20.00	18.90
Butter	4.00	16.00	1.75
Salts	0.65	2.60	2.21
Water	86.35	45.40	61.34
	100.	100.	100.

The percentage of butter in the condensed milk of the New York company is only one-eighth the amount in the original milk, seven-eighths having been skimmed off and sold as cream. It is a notorious fact that most of the condensed milk companies regularly send cream to the New York market.

The tabular statements of the results of the analysis will be found in the special report on milk and its adulteration.

SERVICE PIPE FOR WATER.

Much has been written during the past year on the subject of lead pipe for water, in different cities. The evidence all tends to confirm the opinion that lead pipe is not safe in any case; that although the quantity of this poisonous metal taken up by the water may be extremely small, it is still liable to do harm. In my report of last year are given the quantities of lead found in Croton water which had been delivered through lead service pipe. Even when the water was not allowed to rest a moment in the pipe, it was found to contain lead, taken up during its rapid passage; while, on allowing the water to stand in the pipe over night, it was found to contain one-tenth of a grain of lead per gallon, a quantity ten times greater than is necessary to produce, by long use, lead paralysis.

Galvanized iron pipe is severely condemned by many chemists on account of the zinc which is taken up by the water.

It is still my opinion that the tin-lined lead pipe is the safest and

[redacted]

[redacted]

[redacted]

of flour were purchased at as many different small retail stores and subjected to analysis.

Not a particle of adulteration was found in any one of them. They differed, of course, in quality; many of them were comparatively poor, not the best grades of superfine flour, which was to be expected, but none were adulterated.

BREAD.

I have been engaged in making an examination of baker's bread, and am inclined to think it is not adulterated. My investigation is not, however, completed, and I prefer to make a full report when I shall have accumulated more data.

BAKING AND YEAST POWDERS.

Many substances are now used as substitutes for yeast, and as some of them are comparatively high-priced, it is very probable that they are adulterated. They are generally mixtures, or preparations to be mixed, of bi-carbonate of soda and an acid or an acid salt. Cream of tartar or bitartrate of potash and superphosphate of lime are most frequently used. These substances are often sifted into the flour in the dry condition, which is then known as self-raising flour. To make bread from this it is merely necessary to wet it with water or milk, and after mixing it to a dough of the proper consistence, to place it at once in the oven to bake. These baking powders cannot be considered as adulterations, but they are liable to be themselves adulterated, and it is desirable to make sure that no deleterious substances are employed. A few samples have been already examined, and it is proposed to make a more elaborate investigation during the spring.

SUGARS.

Sixty samples of sugars were purchased at small groceries, and were found to be pure and unadulterated without exception. The dark-colored raw sugars, which are sold in the condition in which they are received from Cuba, are more or less contaminated with dirt, sand, etc. They are also generally acid, and almost always contain the peculiar insect, *Acarus Sacchari*, in the live state.

The refined sugars, "crushed," "powdered," "granulated," "coffee,"

and "yellow," were in no case found to be adulterated. An occasional sample of yellow sugar contained enough iron to darken tea, taken up from the tanks and tubes of the sugar house, but this is accidental and harmless.

The powdered sugar has always enjoyed the reputation of a considerable admixture of powdered marble or terra alba, but I have never detected it. Their presence would be so readily detected on dissolving the sugar in water, in which they are insoluble, that I think no dealer would be foolhardy enough to use them.

SYRUPS.

Some of the sugar-house syrups were found to contain tin. Chloride of tin, with a certain addition of sulphuric and muriatic acids, is added to the syrup to improve the color. The quantities of these agents employed are so small, that as none of them are actively poisonous, or cumulative, I do not know that they are seriously objectionable.

I have detected two hundredths of one per cent. of tin in each of two samples of sugar house syrups sold in this neighborhood. This is equivalent to eight grains of tin to the gallon of syrup, or thirteen grains of protochloride of tin, or eighteen grains of bichloride of tin.

CONFECTIONERY.

An elaborate examination of candies was made more than a year ago, and as injurious substances were found in only one or two cases, no report was made at the time.

The very complete and satisfactory examination made by Dr. Endemann, the Assistant Chemist of the Department, which has already been presented, confirming, as it does, the results which I had obtained, renders it unnecessary for me to give the details of my work.

SPICES.

About twenty samples each of allspice, ground nutmeg, pepper, and cinnamon, were purchased at small groceries and submitted to examination. It was found that the twenty samples of each variety of spice really represented only five or six mills, at which they were ground, mixed, and put up in convenient packages. All are undoubtedly

adulterated with substances of vegetable character; the price alone is generally proof positive of this. Nothing really injurious was found in a single instance.

In conclusion, I may say that there is still an ample field for this kind of investigation, especially in the line of drugs and cosmetics.

Respectfully submitted.

C. F. CHANDLER, Ph.D.,
Chemist to the Health Department.

NEW YORK, April 10, 1871.

"H."

REPORT

OF THE

COMMITTEE ON FINANCE.

To the Board of Health of the Health Department of the City of New York:

The Committee on Finance respectfully submit a report in detail of the expenses of this Department for one year, ending April 10, 1871:

SALARIES.

Commissioners—		
Stephen Smith, from April 11, 1870, to April 1, 1871, 11¾ months, at $5,000 per annum	$4,861 10	
Magnus Grosa, from April 11, 1870, to April 1, 1871, 11¾ months, at $5,000 per annum	4,861 10	
John Mullaly, from April 11, 1870, to April 1, 1871, 11¾ months, at $5,000 per annum	4,861 10	
G. Ceccarini, from April 11, 1870, to April 1, 1871, 11¾ months, at $5,000 per annum	4,861 10	
		$19,444 40
Secretary—		
From April 11, 1870, to January 1, 1871, 8¾ months, at $5,000 per annum	$3,611 10	
From January 1 to April 1, 1871, 3 months, at $6,000 per annum	1,500 00	
		5,111 10
Attorney and Counsel—		
From May 5, 1870, to April 1, 1871, 10 9-10 months, at $8,000 per annum		7,266 67
Carried forward		$31,822 17

Brought forward		$31,823 17
Engineer—		
From November 1, 1870, to April 1, 1871, 5 months, at $4,000 per annum		1,666 67
Chief Clerk—		
From April 11 to June 1, 1870, 1⅝ months, at $3,500 per annum	$486 10	
From June 1, 1870, to January 1, 1871, 7 months, at $3,000 per annum	1,750 00	
From January 1 to April 1, 1871, 3 months, at $4,000 per annum	1,000 00	
		3,236 10
City Sanitary Inspector and Sanitary Superintendent—		
From April 27 to June 1, 1870, 1 4-30 months, at $5,000 per annum	$472 22	
From June 1, 1870, to April 1, 1871, 10 months, at $6,000 per annum	5,000 00	
		5,472 22
Register—		
From June 1, 1870, to April 1, 1871, 10 months, at $4,000 per annum		3,333 34
Deputy Register—		
From June 1, 1870, to January 1, 1871, seven months, at $1,800 per annum	$1,050 00	
From January 1 to April 1, 1871, three months, at $2,400 per annum	600 00	
		1,650 00
Sanitary Permit Inspector—		
From June 1, 1870, to January 1, 1871, seven months, at $3,000 per annum	$1,750 00	
From January 1 to April 1, 1871, three months, at $4,000 per annum	1,000 00	
		2,750 00
Inspector of Street Cleaning—		
From June 1, 1870, to January 1, 1871, seven months, at $2,500 per annum	$1,458 34	
From January 1 to April 1, 1871, three months, at $4,000 per annum	1,000 00	
		2,458 34
Auditing Clerk—		
From June 1, 1870, to January 1, 1871, seven months, at $3,000 per annum	$1,750 00	
From January 1 to April 1, 1871, three months, at $3,600 per annum	900 00	
		2,650 00
Analytical Chemist—		
From June 24, 1870, to April 1, 1871, 9 7-30 months, at $2,000 per annum		1,538 88
Health Inspectors—		
Pay-roll for April, 1870	$1,000 00	
" May, 1870	1,500 00	
" June, 1870	1,395 00	
Carried forward	$3,895 00	$56,577 72

Brought forward	$3,895 00	$50,577 79
Pay-roll for July, 1870	1,500 00	
" August, 1870	1,510 00	
" September, 1870	1,500 00	
" October, 1870	1,500 00	
" November, 1870	1,500 00	
" December, 1870	1,500 00	
" January, 1871	1,666 60	
" February, 1871	1,666 70	
" March, 1871	1,666 70	
		17,905 00
Assistant Inspectors—		
Pay-roll for April, 1870	$1,226 55	
" May, 1870	100 00	
" June, 1870	800 00	
" July, 1870	1,410 00	
" August, 1870	1,563 33	
" September, 1870	1,520 00	
" October, 1870	1,540 00	
" November, 1870	1,064 44	
" December, 1870	1,186 67	
" January, 1871	1,719 99	
" February, 1871	1,620 00	
" March, 1871	1,620 01	
		16,270 99
Clerk Hire Secretary's Department—		
Pay-roll for April, 1870	$949 97	
" May, 1870	716 66	
" June, 1870	900 00	
" July, 1870	900 00	
" August, 1870	900 00	
" September, 1870	1,025 00	
" October, 1870	945 83	
" November, 1870	900 00	
" December, 1870	900 00	
" January, 1871	1,038 32	
" February, 1871	1,216 67	
" March, 1871	1,208 34	
		11,600 79
Clerk Hire—City Sanitary Inspector's Department—		
Pay-roll for April, 1870	$444 43	
" May, 1870	641 66	
" June, 1870	1,041 67	
" July, 1870	1,041 67	
" August, 1870	1,041 66	
" September, 1870	1,066 67	
Carried forward	$5,277 76	$102,354 50

Brought forward	$5,277 76	$102,354 50
Pay-roll for October, 1870	1,066 67	
" November, 1870	1,066 67	
" December, 1870	1,000 00	
" January, 1871	1,120 82	
" February, 1871	1,033 34	
" March, 1871	1,033 34	
		11,598 60
Clerk Hire—Bureau of Records—		
Pay-roll for April, 1870	$1,044 41	
" May, 1870	1,191 66	
" June, 1870	947 24	
" July, 1870	850 00	
" August, 1870	850 00	
" September, 1870	925 00	
" October, 1870	1,007 50	
" November, 1870	1,135 00	
" December, 1870	1,135 00	
" January, 1871	1,335 00	
" February, 1871	1,285 00	
" March, 1871	1,160 00	
		12,865 81
Clerk Hire—Bureau of Sanitary Permits—		
Pay-roll for June, 1870	$125 00	
" July, 1870	125 00	
" August, 1870	125 00	
" September, 1870	125 00	
" October, 1870	187 50	
" November, 1870	412 50	
" December, 1870	375 00	
" January, 1871	416 66	
" February, 1871	416 67	
" March, 1871	416 67	
		2,725 00
Clerk Hire—Bureau of Street Cleaning—		
Pay-roll for June, 1870	$100 00	
" July, 1870	100 00	
" August, 1870	100 00	
" September, 1870	100 00	
" October, 1870	287 50	
" November, 1870	475 00	
" December, 1870	475 00	
" January, 1871	500 00	
" February, 1871	500 00	
" March, 1871	500 00	
		3,137 50
Janitor and Assistants—		
Pay-roll for April, 1870	$116 66	
" May, 1870	180 00	
Carried forward	$296 66	$132,681 41

	Brought forward		$298 66	$132,681 41
Pay-roll for June, 1870			180 00	
"	July, 1870		265 00	
"	August, 1870		255 00	
"	September, 1870		240 00	
"	October, 1870		255 00	
"	November, 1870		305 00	
"	December, 1870		305 00	
"	January, 1871		319 99	
"	February, 1871		320 00	
"	March, 1871		320 01	
				3,061 66

CONTINGENT EXPENSES.

1870.				
May	31.	Louis T. Brennan, notarial services	$47 15	
"	31.	Jacob A. Weil, notarial services	51 80	
"	31.	A. Demarest, seal	15 00	
"	31.	D. Berrien, sundries	69 57	
June	9.	C. Golderman, Jr., sundries	33 19	
"	9.	Norris R. Norton, sundries	40 01	
"	9.	Jacob A. Weil, notarial services	25 15	
"	9.	John Bowne, sundries	4 25	
"	23.	Geo. S. Hastings, sundries	15 10	
"	22.	W. N. Seymour & Co., sundries	17 03	
"	22.	J. W. Haggerty, sundries	6 05	
"	23.	William Wood & Co., map	5 40	
"	22.	J. S. Geran & Co., awnings	33 00	
"	23.	Louis T. Brennan, notarial services	76 90	
"	23.	Jacob A. Weil, notarial services	21 15	
"	23.	Keyser & Co., gas fitting and repairing	19 18	
"	23.	Eastern Dispensary, vaccine virus	139 65	
"	30.	Emmons Clark, Directory	5 00	
"	30.	A. Demarest, badges	291 00	
"	30.	J. S. Geran & Co., awnings	11 00	
July	2.	J. S. Geran & Co., awnings	22 00	
"	2.	Sigler Brothers, framing maps	13 00	
"	2.	Union Livery Stable, coach-hire	8 00	
"	2.	C. Golderman, Jr., sundries	29 18	
"	7.	M. O. Hallenbeck, notarial services	49 25	
"	12.	Ingersoll, Watson & Co., chairs	14 50	
"	12.	Washington Ice Co., ice	7 80	
"	12.	Colgate & Co., soap	5 00	
"	12.	Postage stamps	100 00	
"	20.	Louis T. Brennan, notarial services	86 25	
"	20.	Jacob A. Weil, notarial services	24 30	
"	20.	E. Lee Janes, Medical Registers	7 80	
		Carried forward	$1,195 34	$135,743 07

1870		Brought forward	$1,195 34	$135,743 07
July	27.	Norris R. Norton, sundries	35 29	
"	27.	Walker & Stolley, fitting up	131 94	
"	27.	Robert Paton, fitting up	214 68	
Aug.	4.	Norman A. Beach, sundries	24 80	
"	4.	A. Demarest, badge	6 00	
"	4.	L. B. Lynch, carriage-hire	30 00	
"	4.	E. F. Holbrook & Brother, window-glass	6 80	
"	10.	Thomas H. Bate & Co., sundries	8 00	
"	10.	Washington Ice Co., ice	42 15	
"	17.	J. Ziegler & Co., furniture	23 50	
"	17.	Thomas Kirkpatrick, badges	365 00	
"	17.	A. Demarest, badges	48 00	
"	24.	New York Gas-light Co	13 30	
"	24.	C. Golderman, Jr., sundries	125 00	
"	24.	Postage stamps	13 00	
"	24.	W. N. Seymour & Co., sundries	9 10	
"	24.	E. F. Holbrook & Brother, plate-glass	8 16	
"	30.	Louis T. Brennan, notarial services	50 00	
"	30.	Jacob A. Weil, notarial services	50 00	
Sept.	7.	Norman A. Beach, sundries	23 13	
"	7.	John Fennelly, sundries	2 00	
"	14.	Washington Ice Co., ice	18 00	
"	14.	L. B. Lynch, coach-hire	16 00	
"	14.	O. W. Morris, sundries	30 00	
"	20.	D. Goggin & Son, sundries	31 90	
"	20.	Charles P. Russell, medical registers	2 00	
Oct.	5.	Norman A. Beach, sundries	15 94	
"	5.	W. H. Littlepage, extra services	149 36	
"	5.	John T. Nagle, extra services	209 07	
"	5.	E. C. Berckmann, extra services	79 56	
"	15.	A. Demarest, badge	8 00	
"	15.	L. B. Lynch, carriage-hire	45 00	
"	15.	James Ingram, sundries	51 90	
"	15.	J. Brewi & Co., desk	42 00	
"	15.	Washington Ice Company	13 00	
"	24.	R. C. Bodfish, extra services	50 00	
"	24.	Felix Vinay, extra services	37 40	
"	27.	William Middleton, sundries	44 00	
"	27.	Sigler Brothers, sundries	5 75	
Nov.	2.	Robert Moorehead, coach hire	9 50	
"	2.	Norman A. Beach, sundries	26 06	
"	10.	L. B. Lynch, coach hire	22 50	
"	10.	Washington Ice Company	13 00	
"	16.	Felix Metzinger, sundries	13 20	
"	23.	W. & J. Sloane, carpets	21 65	
"	23.	J. Ziegler & Co., furniture	60 00	
"	23.	New York Gas-light Company	14 35	
		Carried forward	$3,453 33	$135,743 07

1870		Brought forward	[illegible]	[illegible]
Nov.	23.	D. B. Melliah, reporting	53 25	
"	30.	Norman A. Beach, sundries	26 69	
Dec.	8.	Washington Ice Company	13 19	
"	8.	Asten & Throckmorton, sundries	4 60	
"	16.	Smith Brothers, rug	6 50	
"	16.	L. B. Lynch, coach hire	30 00	
"	29.	Norman A. Beach, sundries	30 35	
"	31.	Tenth National Bank, for interest on over drafts, to date	62 82	
1871.				
Jan.	5.	Eastern Dispensary, vaccine virus	97 90	
"	5.	Avery & Penabert, window glass	1 24	
"	12.	L. B. Lynch, carriage hire	27 50	
"	12.	James Ingram, sundries	21 84	
"	12.	Washington Ice Company, ice	8 70	
"	19.	John Hazzard, attending urinal	44 00	
"	26.	E. D. Bassford, sundries	26 50	
"	31.	Tenth National Bank, interest on overdrafts in January	87 07	
Feb.	2.	D. Van Nostrand, map	2 50	
"	2.	Norman A. Beach, sundries	32 62	
"	2.	Benjamin Pike's Son, sundries	6 00	
"	16.	Washington Ice Company, ice	5 40	
"	16.	M. Goldberger, sundries	2 50	
"	24.	Walker & Stolley, fitting up	426 15	
"	24.	John Schnellbowk, repairing	2 00	
Mar.	2.	R. S. Tracy, sundries	8 64	
"	2.	The Medical Record, one year's subscription	4 00	
"	2.	Norman A. Beach, sundries	30 42	
"	9.	Peter Thomson, reporting	15 00	
"	9.	Colgate & Co., soap	4 67	
"	9.	Police Department, fuel and gas to January 1	1,200 00	
"	15.	Robert C. Brown, sundries	29 50	
"	15.	Eastern Dispensary, vaccine virus	150 00	
"	15.	Thomas Willis, chair cushions	9 00	
"	23.	Hervey G. Law, sundries	107 45	
"	23.	N. H. Leadbetter, coach hire	10 75	
Mar.	30.	Norman A. Beach, sundries	26 15	
"	30.	A. Demarest, badges	108 00	
"	30.	G. W. & C. B. Colton, maps	15 00	
"	30.	Delaware & Hudson Canal Company, coal	27 00	
"	31.	Pay-roll, special inspectors small-pox	2,849 89	
				9,076 46

STATIONERY AND PRINTING.

1870.				
June	23.	The World Company	$4 20	
"	23.	The New York Sun	5 60	
July	2.	The World Company	21 60	
		Carried forward	$31 40	$144,819 53

1870		Brought forward	$31 40	$144,819 53
Aug.	4.	New York Printing Company	2,190 08	
"	24.	New York Printing Company	825 28	
Sept.	14.	New York Herald	108 80	
"	14.	The World Company	20 40	
"	29.	D. Appleton & Co	120 00	
Oct.	5.	The World Company	10 70	
"	5.	New York Printing Company	1,018 39	
"	15.	The World Company	45 00	
"	19.	The World Company	21 00	
Nov.	2.	Cushing, Bardua & Co.	33 00	
"	10.	New York Staats-Zeitung	2 40	
"	30.	New York Herald	50 00	
"	30.	James L. Hastie	76 25	
"	30.	M. B. Brown & Co.	54 00	
Dec.	8.	New York Herald	5 60	
"	8.	The World Company	10 20	
"	8.	James L. Hastie	24 00	
"	8.	New York Printing Company	729 14	
"	16.	James L. Hastie	45 25	
"	24.	The World Company	14 40	
"	24.	M. B. Brown & Co.	30 00	
1871.				
Jan.	5.	D. Appleton & Co.	331 50	
"	5.	James L. Hastie	105 68	
"	5.	New York Printing Company	1,021 74	
"	12.	Cushing, Bardua & Co.	20 00	
"	19.	James L. Hastie	851 13	
"	19.	The World Company	12 00	
Feb.	2.	New York Staats-Zeitung	112 50	
"	2.	John Lindemann	100 00	
"	2.	New York Printing Company	124 50	
"	9.	James L. Hastie	670 95	
"	9.	New York Sun	33 40	
"	16.	Evening Telegram	21 00	
"	24.	James L. Hastie	483 63	
March	2.	Courrier des Etats-Unis	7 00	
"	2.	L'Eco d'Italia	31 50	
"	2.	New York Printing Company	244 95	
"	9.	New York Printing Company	407 75	
"	9.	New York Sun	2 80	
"	15.	George W. Averell	7 00	
"	30.	James L. Hastie	454 50	
				10,507 83

DISINFECTANT DEPARTMENT.

1870.				
April	30.	Pay-roll of Assistant Chemist and Disinfecting Corps	$865 24	
May	31.	Joshua Dyson, horse feed	36 89	
		Carried forward	$902 13	$155,327 35

1870		Brought forward	$902 13	$155,327 35
May	31.	E. R. Squibb, chemicals	55 50	
"	31.	Warren Chemical and Manufacturing Company	96 24	
"	31.	Pay-roll, Assistant Chemist and Disinfecting Corps	421 00	
June	9.	J. L. & D. S. Riker, bleaching powders	43 23	
"	23.	John L. Keables, repairing wagons	157 10	
"	23.	A. S. Chamberlin, horse	265 00	
"	23.	Pay-roll, disinfecting gutters	25 00	
"	23.	C. Cooper & Co., chemicals	15 03	
"	23.	Hurd, Miller & Co., harness	130 50	
"	23.	R. Murray, Jr., lime	25 00	
"	30.	Pay-roll, Assistant Chemist and Disinfecting Corps	689 66	
July	12.	J. F. Luhme & Co., chemicals	123 16	
"	12.	H. Kohlbusch, repairing	12 00	
"	12.	H. Endemann, sundries	64 70	
"	20.	J. L. & D. S. Riker, bleaching powders	59 75	
"	20.	Joshua Dyson, horse feed	38 77	
"	27.	Joshua Dyson, horse feed	26 21	
"	27.	P. C. Hubbell, lime	187 60	
"	31.	Pay-roll, Assistant Chemist and Disinfecting Corps	696 50	
Aug.	10.	C. Cooper & Co., chemicals	20 00	
"	30.	John Conway, horseshoeing	25 50	
"	30.	P. C. Hubbell, lime	228 80	
"	31.	Pay-roll, Assistant Chemist and Disinfecting Corps	727 25	
Sept.	7.	Joshua Dyson, horse feed	33 12	
"	14.	Walter & Baumgarten, chemicals	10 98	
"	29.	H. Endemann, sundries	23 58	
"	30.	Pay-roll, Assistant Chemist and Disinfecting Corps	684 50	
Oct.	15.	P. C. Hubbell, lime	263 30	
"	15.	Joshua Dyson, horse feed	38 09	
"	27.	H. Endemann, sundries	15 38	
"	27.	Joshua Dyson, horse feed	33 56	
"	27.	E. B. Cunnion, sundries	3 50	
"	31.	Pay-roll, Assistant Chemist and Disinfecting Corps	901 50	
Nov.	2.	E. R. Squibb, chemicals	59 00	
"	2.	D. Dayton, horse	325 00	
"	16.	Warren Chemical and Manufacturing Company, sundries	98 29	
"	23.	P. C. Hubbell, lime	355 80	
"	23.	H. Endemann, sundries	17 71	
"	30.	P. Cleary, sundries	25 00	
"	30.	Joshua Dyson, horse feed	48 33	
"	30.	A. C. Benedict, sundries	2 00	
"	30.	Pay-roll, Assistant Chemist and Disinfecting Corps	578 00	
Dec.	8.	C. Cooper & Co., chemicals	10 00	
"	16.	D. O'Leary, harness	27 00	
"	24.	H. Endemann, sundries	11 63	
"	29.	Joshua Dyson, horse feed	49 85	
"	31.	Pay-roll, Assistant Chemist and Disinfecting Corps	404 00	
		Carried forward	$8,978 94	$155,327 35

1871.		Brought forward	$8,976 94	$155,327 35
Jan.	13.	C. Cooper & Co., chemicals	35 00	
"	19.	William Roberts, sundries	14 00	
"	26.	New York College of Veterinary Surgeons, medical attendance on sick horse	22 00	
"	26.	H. Endemann, sundries	19 24	
"	31.	Pay-roll, Assistant Chemist and Disinfecting Corps	541 00	
Feb.	2.	John Conway, horseshoeing	36 00	
"	9.	Sebastian & Saal, wagon	260 00	
Feb.	9.	D. Dayton, horse	350 00	
"	9.	Peter Hay, emptying urinal	6 00	
"	16.	Joshua Dyson, horse feed	47 63	
"	16.	New York Gas-light Company, gas for No. 128 Worth street	14 70	
"	24.	Hurd, Miller & Co., harness	70 75	
"	28.	Pay-roll, Assistant Chemist and Disinfecting Corps	703 00	
Mar.	2.	H. Endemann, sundries	21 96	
"	9.	Eimer & Amend, chemicals	104 75	
"	23.	Charles G. Moser, sundries	6 25	
"	23.	H. Endemann, sundries	25 32	
"	30.	W. G. Vermilye	3 50	
"	31.	Pay-roll, Assistant Chemist and Disinfecting Corps	754 00	
				12,012 04

LAW EXPENSES.

1870.				
Oct.	19.	R. M. Lush, marshal's fees	$317 64	
"	31.	P. McCabe, marshal's fees	206 84	
1871.				
Jan.	19.	P. McCabe, marshal's fees	609 60	
"	19.	Jay E. Lee, clerical services	300 00	
Feb.	2.	R. M. Lush, marshal's fees	651 33	
Mar.	23.	Brown, Hall & Vanderpoel, disbursements	53 47	
				2,138 88
				$160,478 27

RECAPITULATION.

Salaries	$135,743 07
Contingent Expenses	9,076 46
Stationery and Printing	10,507 82
Disinfectant Department	12,012 04
Law Expenses	2,138 88
	$160,478 27

Respectfully submitted,

MAGNUS GROSS,
BENJAMIN F. MANIERRE,
THOMAS J. BARR,
Committee on Finance.

"I."

REPORT OF CITY SANITARY INSPECTOR

ON

YELLOW FEVER AT GOVERNOR'S ISLAND.

YELLOW FEVER,

As it occurred in New York City and on Governor's Island during the year 1870, *and the measures adopted by the Board to prevent its further spread.*

On the 13th September, 1870, information reached the Bureau of Sanitary Inspection that a Mrs. Kelly was lying dead at No. 14 Essex street, in this city, who had been sick for about a week, "with a fever, which did not present the types of the ordinary fevers usually found in the city." An immediate investigation of the history and circumstances attending this case aroused the suspicion that it might have been yellow fever. The dead body was therefore sent to the Morgue at once for a specific investigation. The bed was burned, and the rooms and clothing thoroughly fumigated and disinfected.

It was ascertained that her husband, James Kelly, had been sick also with the same symptoms, and had been removed to Bellevue Hospital, where he had died upon the same day (the 12th) as his wife.

A post-mortem examination was held upon the body of Mr. James Kelly, on the 13th September, by the curator of Bellevue Medical College, which, it was presumed, would reveal the true character of the disease.

The hospital record, as made at the time of the investigation, is as follows:

"James Kelly, admitted September 12, 1870; history, obscure; comatose when admitted; skin, jaundiced; respiration, 30; pulse, 116; temperature, 98½ deg. F.; hepatic tenderness; tongue, dry and coated; died, September 12, 3.30 P. M.

"Autopsy, September 13. Brain and membranes, normal; larynx, normal; œsophagus, mucous membrane eroded in longitudinal patches." This case received a coroner's investigation, and the verdict of the jurors was "Death by exhaustion." The medical certificate attached to the coroner's return, certifies that the cause of his death was "Coma (cause unknown)." Signed by

JOHN J. REID, M.D.,
Medical Attendant at Inquest.

No post-mortem examination of the body of Mrs. Kelly was held, but the certificate of death is recorded as follows:

Coroner's verdict—"Pernicious fever."
Medical certificate—"Is supposed to be either yellow fever or typhus fever."
(Signed) WOOSTER BEACH,
Medical Attendant at Inquest.

The records of the examination unfortunately were so meagre as to afford no clue to the disease, and the doubt still existed as to its true character, until subsequent cases and further investigation pronounced the diagnosis.

In tracing the source of their illness, it was subsequently discovered that both Mr. and Mrs. Kelly had been visiting and attending the "wake" and funeral of a relative on Governor's Island, on the 2d and 3d days of September, remaining thereon over night.

This relative, Wm. Harrington, was a soldier upon the Island, who died on the 1st of September, of what was stated at the time as "typho-malarial or bilious fever."

It was also ascertained that a Mrs. Ann McCormack, another relative who had attended the same "wake" and funeral, had subsequently sickened and died on the 9th of September, at 49 Oliver street. The cause of her death was certified by the attending physician as "typhus fever." By careful inquiries, it was found that these three cases presented almost identical symptoms. Their similarity and obscurity indicated a coincident exposure to the same exciting cause, and incited still further inquiry. This resulted (after a delay of four days, caused by false information) in the discovery, as before stated, of their presence at the funeral of Wm. Harrington, on Governor's Island.

Attention being now directed to that island as the source, a Health Inspector, with another medical officer who had been familiar with diseases of tropical climates, was directed to visit it and report upon its character. It was found that a disease of similar character had been prevailing there since the 13th August (over a month), and which the surgeons in attendance described as a type of malarial fever, accompanied with more than usual fatal results. Many of the residents had suffered, some with a very mild attack, readily yielding to treatment, while others, seized in a more violent form, had succumbed. No suspicion of yellow fever had been entertained by the attending surgeons of the post, neither could they become satisfied of the fact until the pathognomonic symptom of "black vomit" subsequently appeared as the disease progressed.

The report of the two officers, after visiting the cases upon the Island, was, that the type of disease was that of the pernicious remittent fever so frequently seen at the South, and which so generally precedes yellow fever in that locality.

The surgeons of the post had made post-mortem examinations of the dead, and had carefully watched with the microscope for casts or other evidences of yellow fever; no case had presented "black vomit," and therefore no correct diagnosis had been made.

The general symptoms manifested in the cases occurring upon the Island were, in all respects, similar to those described in those of the Kellys and McCormack cases. They were as follows: Commencing with a chill, varying from mild to severe in different persons, followed by a fever of mild type, moisture or sweat, with a period of freedom from all, with an accession of the same train of symptoms after a period of thirty-six to forty-eight hours, accompanied with nausea and slight vomiting of a bilious character; in some instances attended with slight delirium, mild diarrhœa in some, and scanty urine, which presented no abnormal appearance under the microscope.

The suspicions which had been entertained by the medical officers of the Board of its being yellow fever were thus, in a measure, quieted, as no positive evidence had yet presented itself.

About this time other cases presenting the same doubtful symptoms occurring in this city had come to our knowledge, all of which were traced to Governor's Island as their source; and a fresh, or rather in-

creased outbreak, with more marked symptoms, having occurred upon the Island, the Board, anxious to settle if possible the doubt, requested Dr. J. C. Nott, a gentleman who had large experience in this special disease in Southern States, to visit the Island and report his opinion. On the 27th September he visited the Island, and the diagnosis was made clear by a post-mortem examination of a recent case of this disease and the presence of "black vomit" in others. His report to the Board on the following day was, that it was undoubtedly "yellow fever." A special committee was immediately appointed by the Board, consisting of the Chairman of the Sanitary Committee, Dr. G. Ceccarini, the Health Officer of the Port, Dr. John M. Carnochan, and the City Sanitary Inspector, Dr. Moreau Morris, and it was authorized to take the necessary measures for the removal to quarantine of those sick with yellow fever at Governor's Island, and to protect this city from said disease; and it was further instructed to investigate the origin of the disease and the circumstances of its introduction at Governor's Island.*

The Committee, upon the same day, visited the Island, and becoming satisfied of the true nature of the disease, so reported to the Board, and at once conferred with the Commandant of the Post, General Neil, with reference to removing those sick, and placing the Island under quarantine restrictions, etc., etc. It was referred directly to General McDowell, commanding the Department of the East, by whose order alone such measures could be effected. The same night, in consultation with General Cuyler, Medical Director of same department, General McDowell promptly issued the necessary orders, as had been suggested by the Committee. The following two days were devoted actively to procuring the means of making the transfer of patients, which was accomplished on the morning of October 1. Sixty patients, including many who were in a convalescent stage, were then removed.

All the bedding and clothing, both of the hospital and patients, were removed with them to Quarantine station and there burned. The hospital and quarters occupied by the sick were for a time vacated, disinfected, fumigated, cleansed and whitewashed, and every effort made to eradicate the infection by such means. Still, other cases continued to present themselves, and new victims followed, although they

* The Report of the Committee will be found in the Appendix.

were transferred to the quarantine hospital from day to day as they occurred, and it was not until the 26th day of October following that the last case appeared.

During this time the Committee made several visits to the island, and at great personal risk, one of them suffering from a mild attack of the disease, undoubtedly contracted during this exposure.

The records of the cases occurring upon Governor's Island, as furnished by the Surgeon of the Post, Dr. Charles Page, are as follows:

Total number of cases from August 13, 1870, to October 26, 1870 159
And total deaths 53

The population of the island at the time of the outbreak was 774.

In its efforts to control the further spread of the disease and effectually to eradicate it from the Island, the Committee suggested such measures as the light of experience and sanitary knowledge has afforded, but from the fact that Governor's Island is a military post belonging to the General Government, and therefore beyond the control of the Health Department, although within its jurisdiction, a full compliance could not be secured. But a strict quarantine of the Island was maintained under the orders of the General commanding, until severe frosts and a cessation of the disease rendered it no longer necessary.

The correspondence between the Board and General McDowell upon this subject is added as an appendix to the annual report.

From time to time the following cases were discovered in this city, during the period of its prevalence upon the Island. Each case was closely watched by the medical officers of the Board, and without an exception all were ascertained to have visited the Island either as nurses or friends of the sick, or were soldiers on leave of absence, taken sick at their homes. The record is as follows:

1. Ann McCormack, 49 Oliver street, died September 9, 1870.
2. James Kelly, 14 Essex street, died September 12, 1870.
3. Mrs. —— Kelly (wife of above), 14 Essex street, died September 12, 1870.
4. David Straney, 12 Pell street, died September 15, 1870.
5. Mrs. Mertens, 89 Clinton street, died September 25, 1870.
6. Peter Becker, 125 Clinton street, died October 1, 1870.
7. Eliza Mertens, 89 Clinton street, died October 2, 1870.
7. Eliza Stelcha, from Governor's Island, at Bellevue Hospital, died October 4, 1870.
9. William H. Morris, 117 West Twenty-first street, died October 9, 1870.
10. Charles Haab, 126 East Fourth street, a soldier on leave, taken sick September 19, recovered.
11. John Haffner, 405 West Forty-first street, a soldier on leave, taken sick September 25, recovered.

There is no evidence of any other case having occurred in the city.

With reference to these cases, it was ascertained beyond all question as follows:

The first four were persons who visited Governor's Island and attended the funeral of Wm. Harrington, who died on the 1st of September and was buried on the 3d; the fifth, sixth, and seventh cases were immediate relatives of Sergeant Merten's, who was sick upon the Island, and whom they visited and attended upon as nurses—No. 5 being the mother, No. 6 the brother-in-law, and No. 7 the sister.

The eighth case was a soldier's wife residing upon the Island, who was removed therefrom surreptitiously, for fear of being taken to Quarantine Hospital, and taken to Bellevue Hospital, where she died, the disease being unrecognized until after death by the medical attendants. Case nine was a discharged soldier from the Island, sick when he left, ill two weeks before death at his father's house. Cases 10 and 11 were soldiers, at home, on leave of absence, taken sick while at home, and remaining there; finally recovered.

These eleven cases, scattered in different portions of the city, it was feared might prove centres for infection, and were watched with great care. In each case all the measures of disinfection and sanitary care were applied which would, if possible, prevent its further spread.

In no instance did any person suffer from its effects, or from the diffusion of any poison therefrom, beyond the case itself, within the city.

The obscure symptoms presented in the few isolated cases occurring in the city, although giving rise to the suspicion of its being yellow fever, and the generally mild character of the symptoms as seen in the few cases observed at Governor's Island by the medical officers of the Board, for a time misled as to its true diagnosis, but, as the disease increased both in numbers and severity, its characteristics became more easily recognized. Commencing late in the season, following a long drought and excessively hot weather, it continued persistently in the quarters where it first appeared upon Governor's Island, until severe frosts seemed to control it, but it is to be feared that another hot season will find its elements again in activity, unless the most radical measures are employed in those quarters where it found a lodgment last season, and where it has before shown itself on previous visitations.

MOREAU MORRIS,
City Sanitary Inspector.

REPORT OF SPECIAL COMMITTEE ON YELLOW FEVER AT GOVERNOR'S ISLAND.

NEW YORK, October 4, 1870.

To the Honorable the Board of the Health Department:

GENTLEMEN—The Committee who were authorized to "take the necessary measures for the removal to Quarantine of those sick with Yellow Fever at Governor's Island, and to protect this city from said disease, and to investigate the origin of the disease and the circumstances of its introduction at Governor's Island," have the honor to present the following report:

Immediately after receiving the resolution of the Board, the Committee proceeded to Governor's Island, conferred with the commandant and surgeon in charge of that post, who concurred promptly with the recommendation of your Committee as to the measures deemed to be necessary, but from want of authority to enforce such peremptory measures the Committee were referred to the medical director, Dr. Cuyler, upon whom they called. Recognizing the necessity for prompt action, and being in entire accord with your Committee as to the necessary measures to be enforced, the matter was laid before General McDowell, who immediately issued orders placing Governor's Island under quarantine restrictions, and the commandant directed to comply fully with any and every precaution and detail your Committee might think necessary.

On the morning of the 30th September, (the Health Officer of the Port having placed his steamer at the disposal of the Committee,) an attempt was made to remove the sick to the West Bank Quarantine Hospital, but the weather proving unpropitious, the removal could not be effected until the day following, October 1. On that day all those found sick or complaining, to the number of sixty persons, soldiers, women, and children, were removed.

The bedding, clothing, and other articles that could possibly have

become infected upon the Island, were all placed upon the steamer, taken to the steamer Illinois in the lower bay, and burned. The quarters upon the Island where the fever had occurred were vacated, fumigated, disinfected, and cleaned. Provision was made for the removal daily to the Quarantine Hospital of any cases that might subsequently occur. No communication will be allowed by any soldiers or residents with the infected quarters upon the Island until after frost shall have rendered these restrictions unnecessary.

Thus, by the immediate removal of all sick, and placing the Island under strict quarantine, your Committee hopes it may be enabled to protect the city from the disease.

The most diligent inquiries have as yet failed to discover that this disease has been communicated to any person within the limits of the city, except those who have been directly exposed to the infection upon the Island, by visiting the sick as nurses or mourners, remaining in the infected locality long enough to have contracted the disease. Since the 12th September there have been seven deaths in the city from this disease, all of whom had been upon Governor's Island for a longer or shorter period, either as nurses for their friends, or as mourners at funerals of those dead of the fever. But three other cases have as yet been discovered in the city up to the present time, and these three were soldiers from the Island, on leave.

Respecting the origin of the disease and the circumstances of its introduction upon Governor's Island, from all the investigation possible in this limited time, your Committee cannot but come to the conclusion that its source has been from infected vessels that have been allowed to land and lie at the docks of Brooklyn, ranging from a point at the Empire stores downward as far as Hamilton ferry, opposite to the eastern shores of Governor's Island.

Any infected article thrown overboard from these vessels would, by the natural flow of the tides at this point, be washed upon the beach at Governor's Island immediately opposite to the quarters where the fever first broke out. At the first visit of your Committee to Governor's Island, on Thursday, September 28, it was difficult to form a decided opinion upon the true character of the disease, as by far the largest proportion of the cases presented symptoms so obscure and mild in their types, that a positive diagnosis could not be made. Two

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October 1, at which date all that were then suffering were removed to Quarantine Hospital, and that these cases are and have been occurring among soldiers quartered upon various parts of the Island, your Committee can come to but one conclusion, that the whole Island has become unmistakably infected with the fever poison, and, as a consequence, dangerous to the lives of those remaining upon it; therefore, we respectfully recommend, that in order to protect the city from the possibility of infection from the Island, as well as to protect the health and lives of those still remaining thereon, it is respectfully recommended that the following resolution be adopted:

"*Resolved*, That in the opinion of this Board the Medical Director of this Military Department, Dr. J. M. Cuyler, should take such measures immediately as will cause the entire evacuation of Governor' Island of all its garrison and other residents, save only such number as may be absolutely necessary for the protection of property left thereon."

That in performing this evacuation the following measures be absolutely adopted: All clothing now worn by the garrison, all bedding or other textile fabrics now upon the Island, that may have become infected, shall be left upon it, and undergo a process of disinfection by steam heat.

The old wooden buildings known as the "Camp Women's quarters" and the "Row," situated near the South Battery, be torn down and burned, the basements or cellars under them filled up to a level with adjacent grounds.

That Governor's Island remain vacated as a garrison for troops, and under strict quarantine restrictions until, in the judgment of this Board and of the Medical Director of this Military Department, the public health will not be endangered by the reoccupation of said Island.

(Signed) MOREAU MORRIS,
City Sanitary Inspector.

J. M. CARNOCHAN,
Health Officer of the Port.

G. CECCARINI,
Chairman Sanitary Committee.

HEADQUARTERS DEPARTMENT OF THE EAST,
NEW YORK, October 10th, 1870.

To the Secretary of the Board of Health of the Health Department of the City of New York:

SIR—I have the honor to acknowledge the receipt of your communication of the 8th instant, containing a copy of the resolutions of the Board of Health and of the report of the Special Committee on Yellow Fever at Governor's Island.

The Board have resolved that, in their opinion, the Medical Director of the Department of the East, Surgeon "J. M. Cuyler, should take such measures immediately as will cause an entire evacuation of Governor's Island of all its garrison and other residents, save only such number as may be absolutely necessary for the protection of property left thereon;"

That "all clothing now worn by the garrison, all bedding or other textile fabrics now upon the Island, that may have become infected, should be left upon it and undergo a process of disinfection by steam heat;

"That the old wooden building known as the 'Camp Women's Quarters' and the '*Row*' situated near the South Battery, be torn down and burned, the basements or cellars under them filled up to a level with adjacent grounds;

"That Governor's Island remain vacated as a garrison for troops, and under strict quarantine restrictions until, in the judgment of this Board and of the Medical Director of this Military Department, the public health will not be endangered by the re-occupation of said Island."

A committee of the Board of Health (Doctors Carnochan, Morris, and Ceccarini) called at my home last Thursday night and stated that the disease which had been prevailing at Governor's Island, and concerning which the medical profession had been in much doubt, had finally been pronounced to be yellow fever.

They then stated they wished as a necessary sanitary precaution that the sick on the Island might be removed to the Quarantine Hospital on West Bank, and the Island be placed in quarantine.

Governor's Island is the principal depot of the United States for receiving, organizing, and instructing men just joining the army, preparatory to their being forwarded to all parts of the Union. It is only to a limited extent under my orders, only so as to its discipline, administration, and police, but the War Department has reserved the power to detach any part of its garrison. Deeming, however, the state of affairs as represented to be one not admitting of delay, and wishing to the utmost to co-operate in anything touching the health of the city, and as the request was not only practicable, but reasonable, I immediately took it upon myself to give the necessary orders (which were carried out at once, and which caused great inconvenience to the service) to transfer the sick to your Quarantine Hospital, and to place Governor's Island in quarantine. In doing so it was clearly understood that the sick soldiers should receive every attention, that I should be suffered to send a medical officer to care for them and keep them supplied with whatever they might need. Under this arrangement the new cases occurring on Governor's Island have been at once transferred to the Quarantine Hospital by a steamer, also in quarantine, kept at Governor's Island for the purpose. On the report

of the Surgeon on Governor's Island, dated the 7th instant, that the stoves, etc., which had been sent by the United States to West Bank Quarantine, had not been allowed by the trustees of the building to be put up, saying it would invalidate the insurance, and that the sick were thus exposed to the cold of that inclement place, the transfer of the sick from Governor's Island was suspended. But the Board of Health having, on the representations made them by Surgeon Cuyler through Dr. Carnochan, authorized the latter to put up as many stoves as might be necessary for the wants of the sick, the transfer was resumed and has continued as long as there were any cases requiring it.

Governor's Island has been in quarantine since last Friday week, the most noticeable infraction of it being, as I understand from this report, by the Committee of the Board itself, who it seems visited the Island and then returned to the city, a course which, in carrying out what I supposed to be the wish of the Board of Health, I have not suffered any one in the military service to follow. The Committee of the Board say new cases are occurring daily, that everything now belonging to the inhabitants of the Island should be disinfected, and I have been called on to keep the Island in quarantine, but now the Board ask that, with a few exceptions, all in it should be made to leave it. Some of them, it is to be presumed, have already become infected. Shall these people, some eight hundred men, women, and children, be brought to the city? or shall they be sent inland? What community would, under the circumstances, consent to receive them? There is no other place I know of where they could be sent where they would be or could be so isolated as where they now are.

The Committee report that "the cases are and have been occurring among soldiers quartered in various parts of the Island, and that they can come to but one conclusion, that the whole Island has become unmistakably infected with the fever poison."

Yet they ask that only the Camp-women's quarters and the "Row" be destroyed. If this is necessary, why is it not necessary to also destroy the hospital where the cases have been treated, and the barracks in Fort Columbus, and Castle William itself, where the men have been quartered. I do not question the efficacy of the plan. To destroy a house is a sure way of disinfecting it; but I am informed and believe it is not the only way excepting in savage life. I am told that the present state of chemical knowledge is equal to the disinfecting of houses and cellars as well as of the more absorbent materials of textile fabric. I am told it is not the practice in New Orleans or Mobile to destroy the houses in which yellow fever has appeared, and moreover that the first hard frost, which we may soon hope for, will itself kill the disease. I take this occasion to place on record the fact that the police of every part of Governor's Island, including the Camp-women's quarters, and the "Row," is and has been exceptionally good, and that under its energetic commander, General Neill, it will so remain. The surgeon on the Island says, in his report of this morning, that since the night of the 8th instant, "there has not a case been reported to the surgeon that is at all suspicious. The epidemic of 1856 ceased on the 9th of October. Frost was seen early this (Monday) morning on the north side of the Island. The worms on the tomato vines were killed, and turned black and hard, on Saturday." There are nearly eight hundred people on the Island, and of this number but seventeen are sick in the hospital, and twelve sick in their quarters. The men are healthy and in good spirits. Being advised, and of the

opinion as above stated, I do not conceive myself justified in assuming to carry out of my own authority, nor of advising the War Department to carry out any of the measures recommended by the Board except such as shall be consistent with allowing the inhabitants and the public buildings of the Island to continue as at present.

I have the honor to be, very respectfully

Your obedient servant,

IRVIN McDOWELL,
Brevet Major-General, U. D.

To the Board of the Health Department:

GENTLEMEN—The Sanitary Committee to whom was referred the communication of General McDowell, respectfully report:

This communication seems to have been written under a misapprehension of the powers and duties of this Board, and of the spirit and purpose of its action in relation to the outbreak of yellow fever on Governor's Island. In no other way can we explain its direct and implied censures, its captious tone and often frivolous assertions. The writer seems to regard the interest which this Board has taken in the epidemic upon the Island as uncalled for, and its acts are construed as an unjustifiable interference with the duties of others. We believe that a fair construction of the acts of this Board in relation to that fever, its discovery and its control, will exonerate the Board from even the suspicion of having overstepped the limits of its jurisdiction, or abused the courtesy which has hitherto been extended to it and its officers by the military authorities of this Department. The discovery by the officers of this Board that an infectious disease, that had been prevailing in the garrison on Governor's Island for several weeks, was yellow fever, caused no little anxiety on the part of the members of the Board. Already three or four cases had occurred in this city, which had been traced to Governor's Island. The season had been hot and dry, and evidently favorable to the spread of the disease should it pass the limits of the Island and gain a foothold in New York. It became a matter of the utmost importance to the Board that every possible and proper precaution should be taken, not only to prevent the introduction of the disease into New York, but to limit its ravages, and, if possible, exterminate it upon the Island. In all its efforts to protect the city, however,

the Board has had to recognize the fact that it has no authority over either the inhabitants, the buildings, or the property on Governor's Island. So effectually is it excluded from jurisdiction over that Island, that it has no knowledge of the sickness and mortality of the inhabitants, except by the courtesy of the commandant or by public rumor. In dealing, therefore, with an epidemic like that now prevalent there, its efforts have been limited to a simple watchfulness over those persons who may escape from the Island, or who, visiting the Island, return to the city. All such persons have been carefully sought for throughout the city by the Health Inspectors, and every possible care taken to prevent any detriment to the public health by exposure to these individuals. In the management of the sick upon the Island, and in the adoption of means for the control and suppression of the pestilence, this Board could only advise with the military authorities, and this it has endeavored in good faith to do in the interests of the public health of New York and of the victims of the disease on the Island. The measures recommended by this Board, and which have been so severely commented on in this communication, were, we believe, important and entirely practicable, and if early adopted would have saved much sickness, and have materially diminished the danger to this city. They were as follows:

1st. *The removal of the sick to the West Bank Hospital.* This measure was concurred in by General McDowell, and the sick were accordingly transferred. The censure upon this Board for not properly providing for the sick at the hospital, was doubtless made in ignorance of the fact that this Board has no more control of the Quarantine Hospitals than of those on Governor's Island, their management being entirely with the Commissioners of Quarantine.

2d. *The removal of the garrison and residents, with the precaution of leaving upon the Island all clothing now worn, all bedding, etc.* This recommendation was made in accordance with the belief, now universal in the medical profession, that the yellow fever poison is not conveyed from place to place in the person, but in the clothing, beds, goods, trunks, boxes, etc., used in and taken from the infected district. The removal of the troops, and other persons, therefore, with the precautions advised, would not, it was believed, convey the disease to any other locality, and might save much sickness and many lives. Should

any of the persons removed fall sick from previous exposure, with complete isolation, and proper care of their clothing, there would be no danger of establishing a new point of infection.

This recommendation was not only based upon principles now well established in sanitary science, but its importance has been forcibly illustrated in the experience of the United States Army, and it has also received the emphatic indorsement of the chief officer of the Medical Department, viz the Surgeon-General. In the report on epidemic cholera and yellow fever in the United States Army in 1867, page xxxviii., Assistant Surgeon Woodward thus expresses "the opinions formed by the Surgeon-General upon the basis of the army experience of 1867 and previous years. Should the disease (yellow fever) unhappily be introduced through neglect to provide an efficient quarantine, it becomes *the imperative duty of the medical officers to recommend the immediate removal of the command to some healthy rural site.* On this subject the reports here discussed are explicit. At the only places at which any large number of cases occurred during 1867, at Galveston, at Houston, at Hempstead, at New Orleans, at Fort Jefferson, the troops faced the pestilence, and at each the greatest portion of those exposed were attacked. On the other hand, the troops moved, on the approach of the disease, to camp in the country, escaped almost wholly at New Iberia, Baton Rouge, Alexandria, Shreveport, etc., while at Indianola, Mobile, Pass Christian, etc., the command being moved after the disease had appeared among them, almost all those thus removed escaped. The Newbern epidemic afforded a similar experience; after the disease had fairly broken out among the troops, the greater part of them were moved away from the town, and nearly all thus moved escaped."

Yellow fever has now prevailed on Governor's Island since August 14, a period of nine weeks, during which nearly two hundred persons have been attacked, an average of about three new cases daily, or about one-fourth of the resident population. Of this latter number, over forty have died. The only possible measure for the complete extinction of the poison is a frost, or a succession of frosts, sufficiently severe to form ice. The period at which that remedy will be applied is uncertain, but the history of yellow fever in New York and its vicinity shows that the fever poison has generally remained active until the last days of October, and frequently as late as the middle or last of November.

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.n, was not only "an imperative duty," but would have
ent and humane act. There can be no doubt that had such
.f the troops as this Board recommended been made at an
eriod to Bedlow's or David's Island, or to some other isolated
.ty, a large amount of sickness, suffering, and death might have
.en prevented, and the dangers of the spread of the disease to this city have been greatly diminished.

The remark, "that if these people were removed they must be sent to this city, or some inland community which might not wish to receive them," and the statement, "that they could not be more isolated than on Governor's Island," are too frivolous to require notice, and could not have been made with a due sense of the responsibility which rests upon those to whose care their lives, health, and comfort are entrusted.

3d. *The destruction of the buildings known as "the Camp-women's Quarters," and the "Row," situated near the South Battery.* These buildings are spoken of by Assistant-Surgeon Guild, in his report on yellow fever on Governor's Island in 1856 (*Medical Statistics, United States Army*, 1855–60), as "a row of old dilapidated frame tenements occupied by soldiers' families, and familiarly known as 'Rotten Row';" again he says, "the only locality within the limits of this post at all suspicious of giving rise to this disease *ab initio*, is that excrescence of the Island, 'Rotten Row.' It is an old wooden shell of a building with many inmates, and affords more filth than all the rest of the Island besides." An inspection of these structures proves that in their location, arrangement, and construction, they are not at all adapted for the comfort and health of their occupants at any time, and are liable to become the centres of infection of yellow fever, cholera, and similar diseases, as their history shows; they belong to a class of barracks long since condemned by the British army as unfit for residence of troops, and liable to become contaminated by infectious diseases. Such decaying wood structures, located in a yellow-fever district, become saturated with its poison, and if closed and removed to another district would

develop a new epidemic into full activity. Whatever chemical disinfectants may be useful in the purification of buildings worth preserving, there can be no question that, in such porous and decayed structures as these, fire will, in the end, prove the most economical remedy.

The cellars, in one of which the first case of yellow fever occurred, should be filled up, and these grounds, so long occupied by a class of camp-followers, and so frequently the seat of infectious diseases, should be devoted to other purposes than that of dwellings. The question is asked, "If these buildings are to be destroyed, why should not Castle William itself, where the men have been quartered, have the same treatment?" If we were to be governed in our opinion of the sanitary condition of Castle William by the candid judgment of a board of officers and surgeons of the army, we believe that, in the interests of humanity, if not of the army, it would be better to destroy this building than to continue to use it as quarters for men enlisted in the public service. This board of army officers was convened in New York during the prevalence of cholera on Governor's Island in 1867, and the following is their report upon Castle William:

Report on Epidemic Cholera, &c., in the United States Army during 1867, p. 64.

"It is also strongly recommended by the Board, that Castle William be discontinued as a barracks for recruits and men, and that permanent barracks, sufficient to accommodate from 300 to 500 men, be erected without delay. It is the opinion of the Medical Officers that the Castle is not suitable for barracks, being damp and cold, giving rise to Rheumatism and Dysentery; *and the records of the post show that, for a succession of years, infectious diseases have commenced among the recruits occupying Castle William.*"

In reply to the statement, "that the only danger of communicating the disease to the city is through the visits of the Committee of this Board to the island," it is only necessary to remark, that there is abundant proof that but for those visits the true nature of a malignant fever, that had already prevailed nearly seven weeks among the residents, would not have been discovered, nor would any measures have been taken to arrest its progress. When it is remembered that similar visits to that island in the earlier history of the city, have cost the lives of eminent physicians engaged in the service of former Boards of Health, it will be apparent that such visits and investigations could have been made only from a high sense of duty to the public. In reviewing the

history of contagious and infectious diseases upon Governor's Island, in connection with the communication of its present military authority, your Committee are impressed with the danger to the public health of New York, of such a community located within a few hundred yards of its most populous commercial centres, of the condition of which the health authorities have no direct knowledge, and over which they have not the slightest control. In the early history of yellow fever in New York, Governor's Island was used as the quarantine ground, but such was the proximity of the Island to the city and the danger of the spread of disease beyond its limits, that the health authorities of that day ordered the removal of quarantine to Staten Island. It appears from this communication that Governor's Island is now used as "the principal depot of the United States for receiving, organizing, and instructing men just joining the army, preparatory to their being forwarded to all parts of the Union." This transient community is made up, therefore, of persons from all parts of the country, and taken largely from the poorer classes of cities. Such a rendezvous must necessarily be constantly liable to the reception of every form of infectious disease, and the history of that garrison shows that diseases like cholera, yellow fever, typhus, etc., have been brought from distant parts of the country and localized within the corporate limits of the city. It is apparent that such a community should be brought under the sanitary surveillance of the health authorities of this city, and be so far under their control as to be compelled to enforce necessary regulations for the protection of the public health.

The Committee respectfully recommend that the communication of General McDowell be placed on file, as part of the history of yellow fever on Governor's Island in 1870.

Respectfully submitted.

By order of the Sanitary Committee.

G. CECCARINI, M.D., *Chairman.*

REPORT OF J. C. NOTT, M.D., SPECIAL INSPECTOR ON YELLOW FEVER.

To EMMONS CLARK, Esq.,
Secretary of Board of Health:

NEW YORK, June 1, 1870.

SIR—I have the honor to acknowledge the receipt of your communication below, and inclose you my report in accordance therewith.

Very respectfully,
Your obedient servant,
J. C. NOTT, M.D.

"J. C. NOTT, M.D.:

"SIR—At a meeting of the Board of Health of the Health Department of the City of New York, held on the 12th instant, it was

"*Resolved*, That Special Inspector Dr. J. C. Nott be requested to prepare and present to this Board a report upon the outbreak of yellow fever upon Governor's Island in 1870, especially as to the causes of the endemic and its progress, the liability of the city and its vicinity to similar outbreaks, and the sanitary precautions necessary to be taken to prevent the pestilence, with such other facts, opinions, or suggestions as in his judgment would be useful to this Board.

"EMMONS CLARK,
"*Secretary, etc.*"

Although epidemics of yellow fever were of frequent occurrence during the eighteenth, and first quarter of the nineteenth century, in the cities, and even small towns, of Pennsylvania, New York, and New England, the city of New York, since the terrible epidemic of 1822, has enjoyed such entire exemption, that our citizens have been lulled into a feeling of security, and the opinion has become general that we have nothing to fear on this score in the future. This feeling of security has no solid basis beyond quarantine and sanitary measures to stand upon. Although cities outside of the yellow-fever zone proper are

more exempt than those within, yet its visitations sooner or later are perhaps no less certain, as the history of our northern cities and those of the Mediterranean abundantly proves.*

From time to time yellow fever knocks at our door, and if it were not kept carefully closed, no one could answer for the consequences. The terrible ravages this disease is now committing in Buenos Ayres probably gives but a faint idea of what it might do in a city of such magnitude as ours. In 1856, during the months of July, August, and September, sixty-four cases occurred on Governor's Island, besides several hundred along the shores of Long Island and Staten Island in the neighborhood of the shipping. And again, last summer, 1870, it appeared in malignant form on Governor's Island, and no one can assign a reason why, on these two occasions, it obtained a foothold on that little clean, well-ventilated, and isolated spot, instead of in the crowded quarter around Fulton Market. In the report of Dr. Moreau Morris, our vigilant Sanitary Inspector, will be found a detailed account of the last Governor's Island epidemic. I will, therefore, introduce here only a few of its leading facts, to serve as a text for what follows.

The population on this Island, exposed to the disease, numbered 774, and consisted of United States Army officers, soldiers, and employés, together with a few families, washerwomen, etc. The first case of yellow fever was reported on 13th August and the last 26th October, two months and thirteen days. The disease commenced in an old

* The fact now seems strange to us that yellow fever is of older date in our northern seaports than in New Orleans, where it has prevailed epidemically thirty-five times in the last seventy-five years. Its first appearance in that city was in 1796, although it had been of frequent occurrence in insular and Central America for more than two hundred years before that time.

Yellow fever prevailed in Boston in 1691, 1693, 1695. In New York, in 1702, 1743, 1748, 1762, 1791, 1793, 1795. In Philadelphia, in 1699, 1732, 1741, 1742, 1743, 1747, 1762, 1793, 1794. In New Haven, 1743, 1794. In Providence, R. I., 1794. It had prevailed in Norfolk in 1747, 1795, and in Charleston ten times anterior of its appearance in New Orleans. It had visited the Bay of Biloxi, a French military station ninety miles distant from New Orleans, in 1702, and Mobile, one hundred and fifty miles to the east, in 1705. It, moreover, had visited Spain in many places (where it was unknown before the discovery of America)—Cadiz in 1705, 1731, 1733, 1734, 1744, 1764, as well as other towns in the Mediterranean. It is an interesting fact in connection with the question of its portability, that New Orleans, though closely connected by geographical position, commercial intercourse, languages and governments, with both insular and Central America, where yellow fever had prevailed for centuries, under Spanish, French, and English rule, was yet always exempt up to 1796. From that time to the present, there has never been a single year without sporadic cases when they escaped epidemics.

building called "*Rotten Row*," on the water's edge, and the following is the weekly report of deaths—the whole number of cases being 159, out of which 52 died.

		DEATHS.
August	20	1
"	27	0
September	3	1
"	10	3
"	17	6
"	24	1
October	1	11
"	8	18
"	15	9
"	22	1
"	29	1
	Total	52

It being evident from the progress of the disease that nothing short of removal could benefit those exposed to the infected place, the sick were carried to Quarantine, October 1, 1870. And it is an important fact to be remembered in connection with the question of contagion, that twenty-nine cases of yellow fever occurred among those left behind *in the infected district*, whilst the sick taken to the Quarantine station, eighty-three in number, *did not communicate it to a single individual.* And to this may be added another significant fact, that eleven patients who contracted yellow fever on the Island, and sickened in the city of New York (of whom nine died), *did not in any instance communicate the disease, though quartered in crowded, filthy parts of the city.*

It will be made to appear, further on, that yellow fever, after a long absence, never makes its reappearance in our northern cities without a warning from the Gulf of Mexico. It is seen not only for months, but often for several years, in vigorous action in its native habitat, before it leaps over its accustomed bounds; but when once on the tramp, it may travel from Buenos Ayres to Quebec, leaving more graves in its track than Asiatic cholera. There is reason to fear that one of these eruptions is now marshalling its forces.

Before any satisfactory progress can be made towards the prevention and cure of yellow fever, it is necessary to comprehend its natural

history more thoroughly, its cause, the circumstances under which it originates, its habits, mode of progression, etc. It must be confessed, however, that many essential facts are wanting, and we are therefore driven to such analogies as may direct our researches.

Yellow fever belongs to the great family of *zymotic* diseases, which opens a wide field, and it is necessary, as a first step, to disentangle it from its congeners and to view it, as far as possible, free from complications.

Zymotic diseases present varied forms, obey different laws, but may, at least so far as their mode of propagation is concerned, be arranged in a sliding scale somewhat after the plan adopted below.

1st. Diseases like syphilis, which are communicable by contact or inoculation alone.

2d. Those like small-pox, which are intensely contagious, and communicable by inoculation, by fomites, and through the air.

3d. Those like scarlet fever, which are inoculable with difficulty or not at all, and contagious in a less degree than small-pox, but communicable through the air, and portable by fomites, etc.

Like syphilis and small-pox, the poison is generated *in* the human system, and eliminated in the same form in which it entered.

4th. Yellow fever, which *is not* generated in the human system, or transmitted from one person to another in any way; but whose germ or poison is generated *outside* of the human system, and is taken in after the manner of marsh malaria poison. But, unlike the latter, its *germ is portable*, and may be carried in vessels, trunks, baggage cars of railroads, etc., from one point to another, and thus propagated.

5th. Marsh malaria fevers, which are strictly endemic—of local origin —not contagious and not portable.

Little objection, I presume, will be made to the above propositions, except, perhaps, the single point touching the *contagiousness* of yellow fever.

There is a very wide difference in the character and behavior of contagious and non-contagious diseases, between which yellow fever forms the boundary line. I will first say a few words about the peculiarities of contagion, and in the present state of our knowledge, the best explanation of its generation and manner of propagation is given by Dr. Lionel Beale, the distinguished English microscopist, which is substantially as follows:

1st. Leaving out of the question its *origin*, the morbific germ of any contagious disease (as small-pox) is communicated from one human body to another, in some form, as *living germinal matter* or *bioplasm*, which germinates *within* the body—multiplies greatly in the same manner as all *living* matter proliferates and multiplies. All such germs are lineal descendants of parent germs—are thrown off from one body—communicated to another, and thus perpetuated.

2d. *Living matter* alone can germinate and multiply in this way. There are no facts to prove that *inorganic* matter has the power of increasing and reproducing its kind in or out of the body. It cannot from an infinitesimal particle, like the virus of small-pox and other contagiums, so increase as to furnish material sufficient to poison a thousand persons, and thus perpetuate itself. When a dose, large or small, of opium, belladonna, arsenic, strychnine, mercury, etc., is administered, the effect is in *proportion to the amount taken*, and its action ends here—there is no *multiplication* of the poison, by which increased action can be developed in one individual, or increase of poison to be handed over to another.

With regard to the origin of such disease germs, we are wholly in the dark. *Some of them* at least have existed for ages and been handed down "from sire to son." Small-pox and scarlet fever, for example, we know to have been imported into Europe from Asia long after the Christian era, and were totally unknown among the aborigines of America before the Spanish conquest. Whether other diseases of this class are still originated *de novo* is a mooted question—for example, typhoid and typhus fevers, cholera and some others. The poison or germ of all contagious diseases will remain in fomites, etc., for such a long time as to render this point a difficult one to decide.

There are, however, certain morbid and contagious poisons that we have every reason to believe *are* generated *de novo*, such as erysipelas, purulent ophthalmia, glanders, hydrophobia, the poisonous pus of traumatic peritonitis, and malignant pustule. Although the foul emanation from decomposing organic matters, human and other excrements, etc., may not *originate* disease-germs, they undoubtedly so affect the air as to produce various deranged states of health, *favorable* to the development of typhus, cholera, etc., "and this predisposition seems to be exactly analogous to the preparation of soil for seed." Not only does polluted air throw the system from its balance, but, there is reason to believe, may furnish the *pabulum* necessary, in many cases, to the propagation of organic germs.

Decaying animal matter, night soil, etc., seems to create for some poisons great centres or foci, where specific germs or poisons are able to

multiply. Dr. Lancaster remarks: "An interesting question for inquiry is thus opened up as to whether the germs of typhoid fever, cholera, etc., could be made experimentally to grow or increase upon or about organic matter, just as the germs or spores of many fungi are induced to grow in collections of manure." "In such collections on the earth's surface," says Aitken, "there is reason to believe that germs of such diseases may find a resting place. *That thus they are always extant somewhere*, although it may only be now and then, when seasons and conditions conspire, that they display their full power as epidemic diseases. As such they seem to occur every now and then as 'mysterious cycles,' the existence of which we admit, but do not understand." "The fallacy that pervades the argument from cases to prove the *de novo* origin of contagious or epidemic diseases is seen in the fact that the poison of typhus, etc., will lie dormant in clothes, bedding, houses, vessels, etc., for a long time and then be brought into life." We all remember the well-authenticated example in London, where criminals, in good health themselves, were taken into the Black Assizes, before the court and others, and their clothes being saturated with the infected air of the prison, typhus fever was communicated to many present, and among others the lord mayor and two judges, who died of the disease. The odor of a dissecting room, of the pus from peritoneal inflammation, and many other odors, both animal and vegetable, will adhere to clothing and rooms for months or even years.

"What is the material substance which passes from a diseased to a healthy organism in small-pox, scarlet fever, measles, and other allied contagious diseases, from which man and domestic animals suffer so severely? The material in question grows and multiplies, and produces its kind as all living things do, and as nothing that does not live has been proved to be capable of doing. We may, therefore, conclude that it is living matter. These poisons not only seriously derange the healthy functions, but having entered the body they multiply many million fold—they are living and increase as living particles alone increase—they grow, they *feed upon the tissues*, and in some cases flourish at their expense, and destroy them."—*Beale.*

Marsh fevers present a very striking contrast when compared with the class of contagious diseases above referred to, and obey very different laws. As the name implies, they arise from external, terrestrial poisons, but whether organic or inorganic is still a question. The professional mind, it must be confessed, is at present strongly leaning to the germ theory, and particularly that of vegetable spores, which, taken

into the system, act as poisons. It is not reasonable to suppose that germs of this kind (like those of contagious diseases) are *reproduced in the body*, as they are not communicable by contagion, nor portable, and may be avoided by removal from the *place* where the cause is generated.

Next comes yellow fever, which occupies a rather anomalous position between the contagious and non-contagious diseases.

1st. Its poison is not generated *in* the human system, and it is *not*, therefore, contagious.

2d. The poison, generated externally, not only attacks persons exposed to the *infected place*, but under unknown circumstances may *sometimes* be transported in vessels, trunks, railroad cars, etc., from point to point, and turned loose to propagate.

3d. Like cholera, it occasionally *leaves its habitat*, assumes a migratory character, travelling over great extents of country, and not unfrequently breaking through the most rigid quarantine.

4th. In these migrations it usually seems to have a prescribed course, along which it pays no respect to any impediments placed in its way; *but places out of its line of travel are often protected by non-intercourse, and hence the great importance of quarantines.*

In order to show with what irresistible force these great yellow-fever epidemics sweep over a country, irrespective of topography and all sanitary regulations, I will here introduce a rather long extract from the elaborate "*Tableau of the Yellow Fever of* 1853," by Bennet Dawler, M.D.:

"The geographical area of yellow fever in 1853, compared with former invasions, was greatly extended, including Florida, Alabama, Louisiana, Mississippi, Arkansas and Texas*—six states of the Union—a vast territorial expansion, consisting of alluvial, diluvial, and tertiary formations, valleys, dry prairies, elevated plateaus, irregular terraces, low undulating hills and bluffs, and pine woods, interspersed with bayous, lakes, shallow basins, shaking prairies, large bays, dense cypress swamps, cane brakes, colossal grasses, inundated plains;—a region undisturbed by volcanic action, where the geological or tilluric causes of disease—if such be really regarded as causes—must be nearly uniform. Of these States five are washed by the almost tideless Gulf of Mexico, presenting a vast, depressed, marshy, sandy, shelly, rockless littoral, which curves from the Rio del Norte to the Peninsula of Florida, deeply indenting the temperate, yet approaching the torrid zone, having low outlying islands in front, and numerous great rivers flowing through the background, bringing detrital matter from the high lands

* In this connection it should be stated that this epidemic commenced in Rio de Janeiro in January, 1850, and continued its ravages for six successive years, reaching Norfolk, and even Philadelphia, in 1855.

and primitive formations of several mountain chains, with tertiary limestones and coral reefs, trending along its eastern portion upon the Floridian peninsula.

"As immense importance has been attached to the topography of yellow fever, which has been generally attributed to swamp exhalations, it will be necessary to take a closer view."

It would be tiresome to the reader to quote further, but the Doctor goes on to show that the disease extended its ravages along the whole coast of six States, in every variety of soil,—penetrated the interior of the States, going up the Mississippi, Red river, and other streams, hundreds of miles, attacking the hills and the valleys, the swamps, and the sandy gravelly soils indiscriminately.

"The report on quarantine and yellow fever by the British government, for 1852, enumerates ninety-six cities, towns, and villages in Spain, wherein yellow fever has prevailed in this century. Many of these places are far inland, high, dry, rocky and hilly, and among the mountains. Ximena, on a hill; Chepiona, on a rock; Medina Sidonia, on a high hill; Los Barrios, in the mountains; Xerez, on a hill; Arcas de la Frontera, on a very high rock; Utera, between two hills; Carmana, on a hill; Moron, at the foot of a chain of mountains; Grenada, 927 feet high, near the Sierra Nevada mountains, thirty-one miles from the sea; Ronda, in the midst of a range of mountains, at a very great elevation."

"Gibraltar, a compact, gray marble promontory, three miles long, seven in circumference, an area of 400 acres, covered in few places with earth, rising 1,500 feet above the sea, which washes its almost inaccessible walls, having had a population of 15,000, lost out of this number in a few weeks, in 1804, from yellow fever, 5,733, or nearly two in five."

The disease again visited Gibraltar in 1813 and 1828.

These great migrating epidemics, often continuing their march during successive years (as did the one above alluded to, between 1850 and 1856), put to flight all theories about *local origin* of yellow fever.

PERIODS OF ACTIVITY AND REPOSE.

All epidemic diseases have their *periods of activity and repose*, and show every possible grade from a sporadic case here and there, up to the most intense and wide-spread epidemics. Yellow fever is no exception to this law, and may be truly said to push it to its greatest extreme. Not only has New York been almost wholly exempt for half a century, after repeated visitations, but many of the towns in tropical America, where it prevails in its most terrible form, have enjoyed similar exemptions. When the disease appeared in Rio de Janeiro, in 1850, the inhabitants had lost all remembrance of its ever

having been in Brazil. A search of their records, however, proves that the disease had visited that country many years before.

Yellow fever is essentially a disease of tropical and bordering countries, though it takes on from time to time a migratory character, and travels far beyond its accustomed limits. It comes up now and then in great epidemic waves, and usually casts its shadow ahead. It is, I believe, never seen as a vigorous epidemic on our Atlantic coast without first showing great activity in Insular and Central America. Although this disease had prevailed on our Atlantic coast repeatedly during the eighteenth century, our records of its outbreaks are imperfect previous to the one of 1793. In that year, after ravaging nearly all the tropical towns, it struck Philadelphia, and was made memorable by its ravages, as well as by the writings of Rush, Hosack, and others.

This was truly a great epidemic wave, scattering death from the mouth of the Mississippi through all our towns along the coast as far as Boston, and even Quebec, *until about* 1805, *a period of twelve years.*

That epidemic having gradually exhausted itself, we heard little of yellow fever again until about 1817, when after ravaging the tropics as usual, it struck our Gulf towns, and through a series of years attacked New Orleans, Mobile, Charleston, Savannah, Norfolk, and, in short, every town along the Gulf and Atlantic, culminating in New York in the terrible epidemic of 1822. It continued to appear irregularly in our Gulf cities, but rarely showed itself on the Atlantic, even as far north as Charleston.

In this last period of repose it seemed to regain new strength, and reappeared with a vigor, perhaps, without parallel. This outbreak commenced in Rio de Janeiro, in January, 1850, and travelled night and day for six years, making its expiring effort in New York Bay in 1856. I had my eye upon this epidemic from its commencement, watching its steady course and ravages along the Atlantic, Caribbean Sea, and Gulf of Mexico for several thousand miles. When it struck New Orleans it was clear to my mind that our own coast was doomed, and before it reached Mobile, I was so certain it would come, that I moved my family into the healthy pine hills, seven miles from the town, where the disease had never been. But in spite of all my prudence, the disease not only came to Mobile, but followed my family out to Spring Hill, where I lost four of my children in one week.

I then wrote to my friend, Dr. Peter Gaillard, in Charleston, that the disease would reach Savannah and Charleston the next year, from the rate at which it was travelling, and to get his family out of the way in time. I wrote another letter to Mr. George Poe, of Georgetown, D. C., predicting that the disease would reach Norfolk the year after (1855), and probably go still further north. To my surprise, Mr. Poe published my letter in the *National Intelligencer*, and I was placed before the world in the light of an unwilling and unwelcome prophet. I would not have been bold enough to risk such a prediction in print had I been consulted, though I thought I had good grounds for it. But, unfortunately, my prediction was fulfilled to the letter, and my record is still to be found on the file of the *Intelligencer*. It is an interesting fact, too, in the history of this extraordinary epidemic, that in the first three of its six years, *while confined principally to the tropics*, it travelled over more than three times the distance that it did during the succeeding three. This is accounted for by the fact that when it got into the land of frosts, it had not more than one-third of each year to do its work in. It was compelled to *hibernate*, and resume its march the following summer. In making my prophecy respecting its rate of travel, I took this fact into consideration. Not only does yellow fever *hibernate* during its migrations, at distant points, but will half do its work during one autumn in cities, resume and finish it the next season. 1842–3 was an example of this in Mobile; 1843–4, in Montgomery, Alabama; 1857–8, in New Orleans, and many similar examples might be adduced.

This *migratory* character of yellow fever has a very important connection with the questions of its *contagiousness* and *portability*. When a disease will travel like this did, several thousand miles for six years, it is often impossible to separate *epidemic force*, contagion and portability from each other. Certain it is that no barrier can stop such a disease in the general course it has marked out, and the question arises as to the possibility of protecting places *out of its regular line of march* by strict non-intercourse.

CAUSE OF YELLOW FEVER.

The *cause* of yellow fever, like those of other zymotic diseases, is unknown, but I think it can be pinned down into narrower limits than

the cause of any other epidemic disease, and by the law of *exclusion* we can remove from this some of the difficulties which surround both contagious and malarial fevers. But it must be confessed that, though we may be able to say what it *is not*, we are yet far from knowing what *it is*.

Yellow fever cannot be an effect of effluvia emanating from decomposition or molecular changes in organic matter, nor can it find its cause in floating vegetable germs, for the plain reason that it *does not operate through the air*. If the *materies morbi* existed in the form of gaseous emanations or atmospheric spores, it would obey the laws of gases and be scattered by the winds over town and country in a few hours. But this is not the case; it will travel through a town step by step, from house to house, for a month or six weeks, uninfluenced in the slightest degree by winds blowing alternately from all points of the compass. In New York, Philadelphia, and other northern cities, the disease *always commences near the shipping, and travels in the most gradual manner, taking several weeks to extend over a very small portion of a town from its point of departure.* So gradual was its progress in the epidemic in New York in 1822, that the Board of Health placed a fence around it in Rector street. The disease extended from house to house, and the Board, watching its progress, extended the enclosure every few days to keep persons out of the infected district. Mr. Isaac Bell, father of Honorable Isaac Bell, of New York, President of Commissioners of Public Charities, then a member of the Board, and a man proverbial for his good sense and veracity, informed me some years ago, that the Board of Health, on that occasion, made a calculation that the *yellow fever travelled forty feet a day.* No man, familiar with yellow fever, will at all discredit this statement. While I was living in Mobile, yellow fever prevailed in the two successive years, 1842 and 1843. In the first year it commenced in Spanish alley, in the southern part of the city, and took *six weeks to overrun one half the town*, or all that part south of Dauphin street, which divides the town into two pretty equal parts, as Broadway does New York. I saw no case originating north of Dauphin street that year, although it attacked almost every house on the south. It would doubtless have gone over the entire town had it not been arrested by frost. The next year the disease commenced in the northern extreme of the town, near Gliddon's black-

smith shop, and swept all the town left untouched by the previous year. Each year it took its *half of the town* more deliberately than the army worm would eat through a cotton field.

The yellow fever on Governor's Island last summer travelled in the same deliberate manner, spreading gradually from house to house, and not reaching its acme before the eighth week. I have just been looking over the Surgeon-General's report of the yellow fever epidemic of 1867 along the Gulf of Mexico (kindly sent me by Surgeon-General Barnes), and I find that *gradual progression* characterized it in every instance. As remarked by Dr. Warren Stone, of New Orleans (who has seen more of this disease than any man on this continent), it will often travel, like a tax collector, from house to house, along a street for two or three weeks before it diverges. So constant is this mode of gradual progression, that when the disease is prevailing in one part of a town at the South, physicians advise persons to flee from other parts to the country to escape it, a month after its first appearance, and such advice is given with perfect confidence.

If, then, the *atmospheric causes* to which I have alluded are without facts to sustain them, we must seek some other explanation more in accordance with the well-known habits of yellow fever.

Insect Hypothesis.—The only hypothesis which, in our present state of knowledge, has any plausible support, and which may assist in directing our future researches, is that which supposes the agency of some minute insect or other organic form, animal or vegetable, possessing the powers of *self-propagation and locomotion*, and which, from its deliberate mode of progression, in spite of calms or winds from all points of the compass, would *seem to travel upon the ground*, where it will be found by the microscopist, if ever detected.* We have abundant authority to show that yellow fever is most active in its operation near the surface of the earth. It attacks persons in a larger proportion on a ground floor than on the stories above, and the immunity increases as we ascend in a house. This was well established by Furguson and others in the West Indies; and in Charleston, South Carolina, in former years, when the disease was more common in that

* An infected vessel would be the best place for microscopic investigations, as we are certain of its presence here in an intense form, from the fact that the disease is readily taken by all who visit such vessels.

city, it was the custom to send children into the third story, and keep them there during the whole epidemic. It is killed, like insects and plants, by a temperature of 32° Fahrenheit. It is more active at night than in the day, as is the case with insects of various kinds. Like insects, it is erratic as to its points of attack, appearing at points here and there in the most unaccountable way. It may attack the inmates of a single house—of a single block—of a ward in a town; it may ravage one half of a city or sweep over the whole, leaving here and there an untouched spot, as insects do in a cotton or grain field. In 1853, during that terrific epidemic in Mobile, there was a Mrs. McKnight, a mantua maker, who had thirteen unacclimated sewing-girls in her establishment, that passed through the entire epidemic without missing a meal from sickness, and I could have stood upon the top of her house and thrown stones against others, north, south, east, and west, in which persons were dying with black vomit. Yellow fever has been known to attack all the sailors in the berths on one side of a man-of-war before reaching one on the opposite side. It has been stopped by a moat and ditch, by the walls of prisons (as the Calaboose, in New Orleans), and we shall see, further on, that in 1856, on Governor's Island, it was arrested by a thin board partition in "Rotten Row." It occurs too, unlike marsh fevers, at irregular periods of several or many years, as many insects do, the germ lying dormant and waiting for its exciting cause. If we examine the history of our cotton plant, of wheat, rye, oats, barley, the Irish potato, the vine, and other plants, we find that they too are subject to their epidemics, all of which occur in this partial and erratic manner, and all of which are distinctly traceable to insects or vegetable fungi. The analogies furnished by various forms of insects are very curious and suggestive. The locust will appear at long intervals, and sometimes in such immense swarms as to darken the rays of the sun. The same fact is seen in connection with certain gnats. One female Termite ant will produce a progeny of 40,000. The aphida are bred by millions in a few days; and out of the half a million of insect species now described by entomologists, we have endless analogies to enlighten us on the erratic habits of epidemics. Yellow fever is, *par excellence*, a disease of towns or crowded populations, and when a town is built on malarious grounds the marsh fevers (in the yellow-fever zone) *are gradually driven from the town*,

while they still infest the surrounding country. Charleston, South Carolina, affords a familiar example. The marshy lands around this city for many miles are among the sickliest on our continent, being almost uninhabitable on account of what they call "*country fever*," a high grade of bilious fever. The city stands upon a part of this sickly region, where they now no longer have the marsh malaria fevers, but yellow fever takes their place. Such is everywhere the history of yellow fever. It is a disease of crowded populations—not of rural districts. The same law applies to plants. Whenever you multiply the growth of any plant, as cotton, grain, the vine, the potato, etc., it becomes subject to new diseases and to great epidemics; in other words, to the attacks of parasites. Yellow fever was unknown in New Orleans previous to 1796, since which time that city has never been a year without it, either in sporadic or epidemic form. Previous to about the year 1830 the cotton plant was so free from diseases that the planter never took these into consideration in considering the chances of failure in his crop. He was certain to make more cotton than his laborers could gather, unless storms or frosts interfered. But of late years, since the growth of cotton has greatly increased and plantations been brought near together, the planter looks with dread to the coming of the bole-worm, the army-worn, the rust, the sore shin, and other insect or epidemic diseases, which may injure or totally destroy his crop.

Like yellow fever, these insects come at irregular intervals—sometimes in successive years and at others after an interval of several or many years. Sometimes, like yellow fever, they will eat up a large or small spot here and there, the half of a crop, or sweep like a pestilence over a hundred-acre field, leaving perhaps only a green spot here and there. These insects then march on, like yellow fever, from south to north, skipping here and there in the most irregular and erratic way.

The diseases of our small grain, the potato rot, the disease of the vine, etc., all show analogies of the same kind. Dr. Beale, who has studied with much care the germ theory, says:

"Of microscopic fungi and algæ there are many different kinds, which grow and multiply under very different external conditions, and live upon different kinds of food. Thus there are germs of numerous different species diffused through the air and wafted long distances at

different seasons; some flourish at a temperature which would be fatal to others; some live on vegetable, some on animal matters; some require solid substances upon and into which they may grow, while others seem to obtain from the atmosphere alone" (as yellow-fever germs seem to do) "all the material required for their growth and development. * * * Some enjoy light, while others vegetate freely in the dark. * * * They remain so quiescent for months (or years) that no one would believe that their germs were in existence; but in a night, the air or water of a district may become peopled with countless multitudes of beings, not one of which was to be found a few hours previously."

It is well known that the eggs of many insects, like the seeds of plants, may retain their vitality for years, and some of the infusoria, as the Rotifers, etc., may be exposed for months to a tropical sun, and become as dry as the sands of Africa, and yet be resuscitated by the application of moisture.

Although the microscope, during the last half century, has furnished an immense amount of curious information in relation to zoöphytes, our knowledge of these organisms is still so imperfect, that Mr. Agassiz and other naturalists have excluded them from their classifications of the animal kingdom. Infusoria from the larvæ, onwards, pass through such varied forms and stages of development, that it is impossible to trace many of them from their origin through their line of descent, and consequently to fix genera and species.

Almost as great mystery surrounds the natural history of *Cryptogamia*. The difficulty, perhaps, arises mainly from the imperfection of our microscopes; and this is one that may never be overcome, as we are seeking to penetrate infinity. Every improvement in the telescope brings to view new worlds and new wonders in the heavens, and still but a step is made in illimitable space. Every new power added to the microscope brings to light more minute living molecules than any known before, and yet the imagination can place no bounds to the divisibility of matter, organic or inorganic.

It is *possible* that even insects may exist a million times smaller than any the microscope has yet reached.

While the slow and steady progression of yellow fever from a point, as I have described it, should be received as an indisputable fact, on the other hand we confess that the fact is at present inexplicable; it

must be some form of living organism, which multiplies and extends by organic laws. If in insect form, it is easy to understand its progress, and, if a fungus, we are not without examples in the larger fungi, of a manner of progression from a given spot more rapid than that of yellow fever. Moreover, it is the business of some insects to distribute certain seeds of plants far and wide; to carry the pollen of one plant to another to fructify it; and it may be the duty of others to disseminate diseases. It is well known, on the authority of Murchison and others, that the malignant pustule is taken by gnats from an animal and communicated to man by its bite. So there *are many ways* that diseases might be carried and communicated by insects or fungi. I will here mention a fact which I have often noticed myself with regard to mosquitoes, but have never seen it alluded to by others. These insects are so abundant in Mobile, New Orleans, and other Southern cities, that it is impossible to sleep at night without the protection of mosquito nets. Fair-skinned persons from more northern climates, and particularly young children recently introduced, suffer greatly from the bites of this insect, the bites often inflaming, and even making tedious, troublesome sores; whereas the children of parents who have lived a generation or two in the climate suffer comparatively little—they seem to become acclimatized against the poison of these insects as they do against the poison of yellow fever. On rising from my own bed in the morning I have many times seen my little children lying in a trundle-bed covered by mosquitoes, after, as Mrs. Jackson said, "kicking the kiver off." The insects had been biting at them for hours, and yet by breakfast-time every mark had disappeared. Such would not be the case with the children of fair-skinned parents recently brought into the climate. Some Southern children, it is true, are more susceptible to the poison of mosquitoes than others, and so it is with regard to susceptibility to yellow fever.

In speaking of *causes*, I must say that I have no belief in the *de novo* origin of yellow fever out of its proper zone, and believe it is of rare occurrence even in the tropics, if at all. All imaginable causes that could have existed from 1793 to 1822 north of the Potomac, have existed during the last fifty years without producing the disease. But let one of those big overflows of yellow fever come surging up from the Gulf, and overflowing Philadelphia, New York, Boston, and all the

smaller intervening towns, as happened in former years, and you will see a *germ left behind*, here and there, that will spring into life from time to time, until, as certain other exotics, it dies out. The Newfoundland dog and the orange tree may live for a succession of years in our Southern States, but soon or late die out and must be replaced. So with yellow fever on our Atlantic coast.

VARIABILITY IN TYPES.

Another problem, yet unexplained in the natural history of epidemic diseases, is that of *variability of type*. Not only does each one, in different years, show marked differences in combination of symptoms, in gravity, in mortality, but in its *degree of communicability or portability*. Nay more, it is by no means uncommon to see two diseases, considered specifically different, blending their types and forming what may be called cross-breeds or hybrids, as do animals and plants. Measles and scarlet fever are familiar examples; they are both contagious and epidemic diseases, and yet at times they lose these characters entirely. A sporadic case may occur here and there, or a family or two may be attacked in the heart of a city, and yet the disease does not spread, nor is it at such times communicated to unprotected persons brought into the room with it. At other times, these diseases are promptly communicated and spread rapidly as epidemics.

Not only is such the case with scarlatina and measles, but even the contagium of small-pox is more virulent and more communicable at one time than another. We are at this moment in New York driven to the most active sanitary measures by the strong epidemic tendency of this disease. I now remark, what I have before witnessed during the "epidemic constitution," a great susceptibility in persons of all ages to the action of vaccine virus, even among those whose systems had, after successful primary vaccinations, repeatedly resisted it. Professor Chapman, of the Pennsylvania University, used to remark, that when an epidemic was prevailing all diseases showed a tendency to "put on its livery." Not only do variola and varicella so blend their types in many cases as to make diagnosis impossible, but other vesicular and pustular eruptions, and even eczema, are so mixed up with variola, not unfrequently, as to embarrass the most acute observer. At a late meeting of our Obstetrical Society, three gentlemen of standing related cases

in which the symptoms of scarlatina and measles were so mingled that it was impossible to say which predominated. Aitken, in his work on Practice, has a good chapter on this hybrid form of measles and scarlet fever.

The blending of typhoid or typhus with marsh malaria is well known and familiarly described during our late civil war as typho-malarial fever.

Aitken justly remarks: "There can be no doubt that cases of an anomalous or mixed nature do sometimes occur, concerning which a decided diagnosis cannot be given from the general symptoms merely; and the term *continued fever* has become a refuge for many of uncertain character. *The poisons of tropical fevers especially require to be carefully studied, and the phenomena of the febrile state which accompanies them embrace medical problems of the most abstruse character.*"

Dr. Murchison, in his able paper on the nature of typhus and typhoid fever, published in the Medico-Chirurgical Transactions, states that he omitted two hundred cases from his table as "*doubtful*," which could not be classed with "typhus or typhoid fever." Genuine yellow fever, and *remittent or bilious yellow fever*, so often spoken of by authors on tropical diseases, show the same confusion of types. The *types* of so-called yellow fever present an almost unexplored field—first, because our means of diagnosis heretofore have been very imperfect; and second, because competent observers have not lived long enough in the homes of yellow fever to become familiar with all its phases.

Dr. Warren Stone, of New Orleans, very justly remarked that when he had seen one epidemic of yellow fever, he thought he knew all about it, but after seeing twenty epidemics he discovered that he knew nothing about it. This is not to be wondered at when we reflect on the history of *continued fevers*. Typhus, typhoid, and relapsing fevers, etc., even within our recollection, were all thrown into one confused mass; and it has only been of late years, through the combined labors of French, English, German, and American pathologists, that these diseases have been separated and classified. Yellow fever unfortunately has not yet had the same amount of time and ability brought to bear upon it.

When one who has worked through many epidemics of yellow fever picks up such writers on the subject as Aitken, Wood, the English and

American army and navy surgeons, who have never *seen* the disease at all, or only one or two outbreaks, he is struck at every step by the imperfect descriptions of symptoms, false facts, and groundless theories.

When such men as Andral, Louis, Chomel, Murchison, and Virchow, shall pass their whole lives in the tropics and study *all the forms* of yellow fever, we may then be able to separate types, and to say which is portable and which is not. We already know, from numerous authorities, *that there are unquestionable cases of bilious fever that resemble yellow fever more closely than typhoid does typhus fever*, and that we have no way *at present* of deciding between them except by the portability and migrating character of one, in opposition to the *non*-migratory and *non*-portable character of the other. And then the question comes up as to whether an intense form of bilious fever might, as cholera has done, *become portable and migratory*. No one ever supposed, previous to 1817, that cholera, which had always been regarded as an *endemic*, could take on the most migratory character of any disease known.

If we accept the theory so ably sustained by Dr. Lionel Beale as to the manner in which contagium operates in the body, is eliminated and communicated, we may offer a plausible explanation of this blending of types. According to his idea the origin of all contagions must be sought in the form of *living germs*. They enter the system as particles of germinal matter, or bioplasm, which proliferate and multiply in the body. After a time similar germs are thrown off, are communicated to other subjects, and thus perpetuated. If this theory be admitted, and be equally applicable to all contagious diseases, it is easy to conceive that if two sets of disease-germs enter, or be present in, the system at the same time, they will be so blended as to form cross breeds, or hybrids, as above stated. When yellow fever and marsh malarial fevers, whose germs are bred *outside* of the human system, are brought in contact, the hybrids may result either from a mingling of the *materies morbi before* entering the body, or from the combined operation of the two after entering the body.

Yellow fever, in many respects, is so anomalous in character as to stand alone; and in nothing does it show its peculiarity more than in its *variability*. It is *never contagious*, but varies greatly in intensity at different times and places, in its disposition to spread, and more espe-

cially in its *portability*. At one time, as shown in another place, a port may be thrown open without quarantine restrictions to vessels coming in freely with yellow fever on board from infected ports, and yet the disease is not propagated; while at another time, with fewer chances, it will take root and spread in almost every place to which it is carried. The two facts of portability and *non*-portability are equally well authenticated, but I know of no example of such perfect contradiction in the history of any *contagious* disease. Small-pox, scarlatina, measles, typhoid fever, etc., each differs in *degrees* of contagiousness, when compared with itself at different times and places, but never presents such direct contradiction as yellow fever does in regard to *portability*, and more especially during their respective active epidemics. Such widely different characters in individuals of the animal or vegetable kingdoms would be considered quite sufficient to mark *distinct species* of a genus.

An interesting confirmation of the germ theory of Dr. Beale, as applied to contagious diseases, is seen in the behavior of the vaccine virus. When the virus of variola is introduced into the cow (being *living* germinal matter, or bioplasm), it there finds a pabulum on which it thrives and proliferates, but a pabulum *different from that on which it fed in the human body*. This living matter goes on budding and multiplying in the cow to an enormous extent, as living bioplasm alone can do; living germs are then thrown off (lineal descendants of the parent stock), *but so modified in nature as to have not only lost their virulence, but the small-pox contagium!* The virus which, before it entered the cow, could scatter pestilence over a land, is now regenerated, born anew, and comes forth an *antidote* to the very bane from which it sprang!

If small-pox can thus be so completely metamorphosed in its nature, why may not yellow fever, under influences equally unknown, be so modified as to present itself at one time in a *portable* and at another *non-portable type?* Who can tell to what influences it has been subjected in passing from ship to ship, and in travelling hundreds or thousands of miles through malarious districts, in contact with other diseases, endless atmospheric conditions, etc.? The two cases of small-pox and yellow fever present a curious analogy in this point. Small-pox, an animal poison, in passing through the cow, *loses its portability*,

except by inoculation, while the germ of yellow fever, not bred in the body, receives its modification through some outside influence;—the one is just as comprehensible as the other.

Yellow fever, not being an atmospheric disease, the above facts naturally point to an explanation for the apparent contradiction in its *portability* and non-portability in different seasons. If the theory of living germs be admitted as the cause of yellow fever, whether animal or vegetable, they probably obey the same laws of genera, species, and varieties which govern other organized beings. But the analogy does not stop here.

We have many species in the same genus of plants that differ widely in their effects upon the human system, when applied in their state of nature; and these same species become, in many instances, greatly metamorphosed by change of climate, soil, and cultivation. Some plants, offensive to the senses, and even poisonous, are rendered agreeable and edible by cultivation.

Allied species of insects differ greatly in their poisonous qualities, and the same insect in one climate may be innocuous, and in another more or less poisonous. Another illustration may be found in the different species of serpents. Some are as innocent as kittens, some intensely poisonous, and others poisonous in various degrees. They differ, too, in their manner of affecting the system, some coagulating the blood, while the poison of others does not, etc. The intensity, too, of the rattlesnake and the viper poisons differs in different seasons of the year, and in different countries.

There is, then, no *identity in the poisons of allied species* of plants, insects, or reptiles; and if yellow and marsh malarial fevers find their causes in organic forms, we cannot withhold from these obedience to similar laws, which characterize genera and species.

Our present classification of zymotic diseases is confessedly imperfect, and for the reason that we are ignorant of their causes. The hope is not an unreasonable one, that at some future day we may be enabled to arrange them in genera and species with at least as much exactness as we now do the vegetable and animal kingdoms. Yellow and the marsh fevers fall naturally into one group, and may be regarded as *allied species* of a common genus, and all having their being in living organisms. The gradation in this group is curious and instructive. First,

we have one form of yellow fever that *is portable*, and another that *is not*. Next, we have two forms of yellow fever, presenting different anatomical lesions, one characterized particularly by the bloodless, gingerbread, fatty liver, as described by Louis and Alonzo Clark; the other by the engorged, slate-colored liver of bilious fever. Close upon these types of yellow fever follow the malignant forms of bilious fever, which, in exceptional cases, simulate yellow fever so closely, as in many instances to make diagnosis impossible. In mode of invasion, in course and duration, in symptoms, including hemorrhages, black vomit, collapse and yellow skin, the likeness is so strong that no one can distinguish one case from the other. We can only separate the two diseases by appealing to their histories on a large scale. Bilious fever is never portable—one form of yellow fever is. Bilious fever is never a migratory epidemic; it is purely endemic, and arises from local causes, and may be avoided by leaving the place of its origin. One attack of yellow fever affords perfect immunity against others, but none against any grade of marsh fever. Any number of attacks of marsh fevers afford no protection against others or against yellow fever. Notwithstanding all these points of difference in their behavior, it is not yet demonstrated that an intense form of marsh fever may not, as cholera does, leave its accustomed habitat and migrate as an epidemic. Aitken and other writers on tropical diseases have written a great deal about bilious, remittent, yellow fever, and confirm fully my personal observations as to its strong likeness to yellow fever.

Here, then, we have a link connecting yellow and marsh fevers so closely, that no one can say where one ends and the other begins. The fever last summer on Governor's Island, from the description given me by Surgeon Page, would seem to belong to this connecting link. The topography and medical history of this diminutive island, precludes the idea of any *local cause* for malaria of such malignant form. No intermittents preceded or accompanied this outbreak of fever. The first case appeared on the 13th of August, and the disease developed so slowly in the number of cases and in gravity of type, that it was not till late in September (about six weeks) that its true character began to be suspected. By request of the Board of Health, I visited the Island on 28th September, with a note of introduction to Surgeon Page, in charge of medical department; he very politely

gave me the history of the disease from its commencement, showed all the cases under treatment, and made for me the post-mortem, the only local subject on hand.* Familiar as I was with yellow fever, I had no hesitation in declaring its character. It must be confessed, though quite as fatal as any form of yellow fever, the majority of the cases up to this time did not present well-marked symptoms of yellow fever, and the correctness of my diagnosis was doubted; but the rapid progress of the disease after this, and its fuller development, soon left no room for doubt in the mind of any one who saw it. It is also worthy of remark that quinine, which had been freely given, exerted no controlling influence over the disease, as is proved by the fact that it died out in 117 cases. If now we pass to the yellow fever of the lower Mississippi fevers, we find an endless chain of bilious—remittent fever, that is, from two to five days' high grades of bilious fever, running into fifteen to twenty-one days' pernicious, comatous, ataxic, etc., and yet we are taught that these all arise from the poison developing only in gas of marsh. The fevers of the Delaware and Hudson rivers, those of the sea-coasts and hills of the Carolinas, of the swamps of the Gulf States, of tropical America, the jungles of Africa, etc., are all thrown into the huge shapeless mass. It is no argument in favor of theory to say that several types of marsh fevers come in the same sea and same locality; that they blend their types in every possible way, and precede and follow each other. We have already seen that the system may be exposed to any two epidemic or endemic influences at the same time without showing the marks of both. Nor is it any argument in favor of theory to say that quinine cures them all, for all we know it is to say that all these fevers and diseases are the same because they are destroyed by muriatic acid. It is more rational to believe that the different marsh malarial fevers are allied species of a common genus. It is very observable, it would be an anomaly in nature. In the very places where these several types of fever appear we see plants, trees, and insects presenting in like manner numerous and varied species, and the same law should be applied to those allied diseases which we have so many reasons to believe spring from living organisms.

* There was nothing in the autopsies which was not to demonstrate a true yellow fever. The liver was dark and fatty, the blood dark, and Dr. Page observed no clot until the last few days of the epidemic when

I have above alluded to the different anatomical lesions seen in different epidemics of yellow fever, and we have similar evidence respecting marsh fevers. In some of the violent types, where the attacks are of short duration, no lesions at all are found, and Aitken, who has sifted the evidence very thoroughly, remarks: "The affections of the liver and spleen also vary greatly according to country, for in some parts of India the spleen is the organ chiefly affected, while in other districts it is the liver."

Abscesses of the liver, so common in the fevers in India, are not seen once in a thousand cases in our Gulf States.

QUESTION OF CONTAGION.

The laws by which epidemic diseases are governed in their migrations from one country to another are unknown, and therefore seriously complicate the question of contagion. From the rapidity with which they often sweep over a continent, here and there leaping over hundreds of miles, and even attacking vessels in the middle of the ocean that have had no communication with infected ports, we are forced to conclude, that whether contagious or not, they are propagated by some *epidemic influence*, independently of contagion. This is strikingly the case with cholera and influenza, but yellow fever, from the extreme deliberation with which it creeps along, has afforded much stronger grounds for the opinion of those who advocate contagion.

Cholera, from its primitive habitat in India, assumed the epidemic character in 1817, and worked steadily on through Asia, broke over the mountains into Russia, and thence down through Europe to the Mediterranean; and finally, crossing the Atlantic in 1832, struck Canada and swept the continent of America, after travelling the whole length of the United States, from the St. Lawrence to the Gulf, in a single year.* So with yellow fever; though less rapid in its movements, I have shown that from time to time it comes in great waves, travelling from south to north through a series of years, and appearing at many points under circumstances to preclude the idea of contagion. The two questions, however, of contagion and *epidemic force*, as well as that of *portability independently* of contagion, are often so mixed up as to be inseparable, and great caution becomes necessary in the ascer-

* It is an interesting fact, that although cholera prevailed during the intense cold of winter in Moscow, its ravages in the United States have been usually arrested by winter.

tainment of positive, uncomplicated facts. It often becomes impossible to decide whether the disease has been communicated by one individual to another near by or at a distance by contagion, or whether it has been transmitted by its epidemic force. Another complication, not less embarrassing, comes in to disturb our decisions, viz., the probable *original importation and naturalization of foreign contagious and epidemic diseases.* Small-pox, for example, though known in China more than one thousand years before the Christian era, was unknown on our continent until after the discovery of Columbus, and not in Europe until some centuries after our era. There was not a pock-marked Indian on this continent before the Spanish conquest.

Scarlet fever affords another example equally strong. This disease was unknown in Europe many centuries later than small-pox, and was so rare in the United States, that Dr. Rush makes the remark that "*no physician in the United States would be likely to see scarlet fever more than once in a lifetime.*" And yet these diseases have become naturalized in this country, with all the habits they had in Asia and Europe. The *materies morbi* lies dormant for a few or many years, and then starts into activity. They skip about in the most erratic way, without our being able to discover the laws by which they are propagated, and we are often embarrassed to determine whether the outbreak at a given point is to be attributed to contagion or epidemic influence.

The first epidemic of scarlet fever ever seen in South Carolina I witnessed in 1832. It appeared in Huntsville, Alabama, the same year; and Dr. Arnold, of Savannah, informs me it made its first appearance in that city in 1836. In the autumn of 1849 I for the first time read the very instructive work of Williams "on Morbid Poisons," in which many curious facts are given bearing on this subject. Cholera had not visited the Mississippi Valley for many years, and it was generally believed that we should never see it again. Connecting its history, however, with that of other imported diseases, I closed the book with the conviction that the cholera had *left its germ behind*, scattered over our country, and that it would, like small-pox and scarlet fever, come to life and travel again over the same route it before had followed. I so expressed myself in strong terms to a medical friend, and in less than a month from that time (November, 1849) I saw a patient die with the disease in the vicinity of Mobile, before any suspicion had been

breathed respecting the advent of cholera. During the next month, being in New Orleans on a visit, I went to the Charity Hospital. While in conversation with Professors Warren Stone and James Jones, a patient in the collapse stage of cholera was brought in, which was the signal of the epidemic that followed. All the facts since have shown conclusively that the epidemic cholera of 1832 *did leave its germ behind*, and that, like small-pox, scarlet fever, and yellow fever, it sleeps and wakes in accordance with laws unknown to us.

Few of the old and experienced physicians of the yellow-fever zone believe in the contagiousness of the disease, and their convictions are based upon countless facts like the following:

Drs. Warren Stone, Bennet Dowler, James Jones, Chaillé, Harrison, Hunt, and others, of New Orleans, tell us that when yellow fever occurs in that city (which is about every other year) along the river front, any number of cases may be taken from the infected district to the Charity Hospital, a mile or more distant in the interior of the city, without communicating the disease to the unacclimated inmates, or to any of the dwellings in the immediate vicinity. No case is ever seen to originate in the hospital or its neighborhood, until the disease, marching slowly and steadily for several weeks, has reached this point *by its epidemic influence.* This is what has happened not only once, but repeatedly.

During thirty years' residence in Mobile my experience has corresponded with theirs. The disease takes its own time to travel through the town, and persons carried from the infected districts to other parts of the town, or into the country in private houses, and dying with black vomit, do not communicate it. The experience of New York and Philadelphia fully corroborates this conclusion.

No stronger evidence of the non-contagiousness of yellow fever could be asked than is seen in the history of this disease in New York port and city last summer. One hundred and fifty-nine cases occurred on Governor's Island, of which 52 died, and nine of those that sickened after exposure on Governor's Island, died in the city with black vomit, in filthy, crowded, populous parts of the city, and yet in not a single instance was the disease communicated. I visited nearly all of these cases with Dr. Moreau Morris, the Sanitary Inspector, and can vouch for the genuine character of the disease. Moreover, on the 1st October, 1870, all the

sick were taken from Governor's Island to the Quarantine, without communicating the disease to any one there. In 1856 the facts were still stronger; not only was the yellow fever confined to a limited part of the Island, but attacked all in the rooms on one side of Rotten Row, and none on the other. These facts are entirely in accordance with the opinions of our best writers.

Physicians who have not passed their lives in the yellow-fever zone, and who rarely see the disease, are sure to form hasty conclusions, and cite examples of contagion that will not bear investigation. Epidemic laws, contagion, portability, and local origin are all thrown into one confused mass, without inquiring whether the disease is simply contagious, epidemic, or portable.

Circular No. 1, *War Department, Report on Epidemic Cholera and Yellow Fever*, in 1867, affords a strong proof of this hasty manner of viewing facts by intelligent surgeons of limited experience. After giving in detail the history of the outbreaks of yellow fever in 1864 and 1867, at some fifty different places, and *tracing them all to exotic origin*, and many of them to *personal contagion*, the report winds up with the following paragraph:

"Should the disease, unhappily, be introduced through neglect to provide an efficient quarantine, it becomes the imperative duty of the medical officer to recommend the immediate removal of the command to some healthy site. On this subject the reports here discussed are explicit. At the only places at which any large number of cases occurred during 1867—at Galveston, at Houston, at Hempstead, at New Orleans, at Fort Jefferson—the troops faced the pestilence, and at each the greater portion of those exposed were attacked. On the other hand, the troops moved, on the approach of the disease, to camp in the country, escaped almost wholly at New Iberia, Baton Rouge, Alexandria, Shreveport, etc.; while at Indianola, Mobile, Pass Christian, etc., the command being moved *after the disease had appeared among the men, almost all thus removed escaped.* The Newbern epidemic afforded similar experience. *After the disease had fairly broken out among the troops, the greater part of them were moved away from the town and nearly all thus escaped.*"

Such is the history of yellow fever. If a regiment quartered in an infected district is removed a few miles away, with one hundred of the command carrying the seeds of the disease with them, who sicken and die with black vomit, the disease is communicated to no one else. Where an infected vessel sails up to a wharf, another question arises with regard to *portability of the germ*, which is *not bred in the human body*. This germ is not only *sometimes* conveyed by vessels, but *some-*

times taken in trunks, boxes, etc., though never *personally contagious.* Why, these contradictions, though facts, are yet without explanation.

PORTABILITY OF YELLOW FEVER.

Having declared my disbelief in the *contagiousness* of yellow fever, it remains for me to give my reasons for believing in its *portability.* If the germ originates and is propagated *independently* of the human body, we can readily understand how it might be carried in a ship or trunk from place to place, and turned loose to propagate, but the existence of such a germ is a mere inference, based on the natural history of the disease.

In seaport towns, within the yellow-fever zone proper, the disease not unfrequently will start from a single focus, and spread from this, day by day, for weeks, before it covers one-half or the whole of a town; but, perhaps, just as often it will appear in different points of the town about the same time, and spread in all directions. When, however, yellow fever occurs in a northern city, as New York or Philadelphia, it always commences in some locality near the wharves, and extends gradually from such focus; and so limited is this focus, and so gradual is the extension, that there is good reason to believe the disease, in some instances, might be eradicated if the little infected spot could be annihilated, or means for thorough destruction of the existing germ there at work could be applied. From the gradual manner in which it spreads from its *point de depart*, it clearly has the power of *self-propagation.*

In the example just given, it is needless to inquire *how* the *materies morbi* got its foothold at a certain point in a city, and then extended. I only desire here to fix attention upon the facts that it thus often commences at a point and propagates itself. Let us now go a step further, and bring an infected vessel in from Buenos Ayres or New Orleans with a number of yellow-fever cases on board. Experience proves that in such a vessel is found the *materies morbi* in its most concentrated form, as is shown by the conceded fact, that almost every one visiting such a vessel, and spending a night—a few hours or minutes even—on board, will contract the disease in virulent form. Now, suppose such a vessel were dragged up into Fulton street, or even placed alongside the wharf, can any one imagine a reason why the disease should not

propagate itself from this focus with the certainty that it did from "Rotten Row," on Governor's Island, last summer, and, as it always does in epidemics of yellow fever, from an established focus?

The laws by which yellow fever is disseminated present difficulties which I am not disposed to smooth over, as the truth alone can be of use to us. I have denied its contagiousness, and denied that it is influenced in its progress by winds, and am therefore called upon to explain the following facts:

1. Yellow fever is rarely seen in northern cities, except when infected vessels have recently come into port, and although such vessels are stopped at the Quarantine, and made to anchor off in the Narrows, several hundred yards from the shores, still the disease finds its way by some means to points here and there along the shore, as it did last summer on Governor's Island—as it did in 1856 along Staten and Long Island shores—and on other occasions here and in Philadelphia. It is communicated under such circumstances, according to my opinion, by its own epidemic force, or by the conveyance of the germ in trunks, etc., through illicit intercourse; one, or both these causes combined, is sufficient to account for its extension. There is no need for the influence of winds to explain the spread of yellow fever with the broad fact staring us in the face, that the "great epidemic" of yellow fever, which started in Rio de Janeiro in January, 1850, travelled six years steadily on, sweeping everything in its course on to Norfolk in 1855, lying dormant in the winters of 1853 and 1854, and taking up its line of march in the summers. I have said above that yellow fever rarely appears at the north, unless in connection with infected vessels from the south, yet there is reason to believe that when it does get a strong foothold in northern cities the germ may remain for years. After the great outbreak in Philadelphia in 1793, for example, the disease continued to appear more or less for fifteen years before it entirely died out, and such instances are not rare. The question may well be asked, Was the yellow fever of 1856, in New York harbor, the winding-up of the Rio fever that reached Norfolk in 1855? It was carrying out a course I had predicted in 1853.

2. The next difficulty is found in the fact that it not unfrequently happens that infected vessels, from infected ports, will come freely into other ports unrestrained by quarantines, and yet the disease does

not spread. The extract below from the Tableau of Dr. Dowler establishes fully this point, which I see no other way of explaining than by supposing the existence of *two distinct types of yellow fever*—one portable and the other not portable—the virulent form being modified in some way (analogous to the modification of the small-pox virus in passing through the cow), by which it loses its portable character. Or the non-portable type, as I have hinted above, may be a high grade of bilious fever, which has, from some unknown influence (like cholera in 1817), *assumed a migratory character.*

The subject of yellow fever is one of too much importance to allow of *ex parte* evidence or special pleading, and I desire to present the facts opposed to my opinions in the strongest truthful light I possibly can, and I do not see how I can better attain this end than by introducing the following quotation from the "*Tableau of the Yellow Fever Epidemic of New Orleans in* 1853," by Dr. Bennet Dowler, probably the best informed man living in the literature of yellow fever. He has also lived in New Orleans through a long list of epidemics, and been an attentive observer.

"The great majority of learned men in Europe attributed the black plague to the conjunction of Saturn, Jupiter, and Mars, on the 24th March, 1345; just as many now attribute the late epidemic (1853) to events that *happen to coincide in time and place.* Those not irrevocably wedded to contagion might find it useful to study the events which have passed before their eyes in the last seven years.

"The late Mexican war furnishes the most complete refutation of the contagiousness of yellow fever in the absence of quarantine, so far as negative evidence can go. If the United States Government had tried to devise an experiment on a vast scale, to ascertain whether yellow fever could be propagated by ships and armies, it could not have achieved its purpose more effectually. In 1846–7–8 this malady existed in Tampico and Vera Cruz, and was very severe in New Orleans in 1847. The troops and the material of the army, leaving New Orleans for Vera Cruz, and Vera Cruz for the interior of Mexico, did not suffer themselves from yellow fever, nor spread contagion through the towns and country. In 1848 thousands of the returning soldiers passed through Vera Cruz in June, where the yellow fever existed, and on reaching New Orleans in July and August, a few died out of the fifteen thousand that remained in the city and its environs some time, without communicating any disease to the city by means of their goods, army materials, and selves. Thousands thus, without being quarantined, remained in the city for a time, and quitted it for their homes, in other towns and places, without having communicated the disease to any one. After the reduction of Vera Cruz, yellow fever appeared, and many invalids and sick persons were sent to New Orleans and other places for treatment in the transports which carried out the troops, yet they did not propagate the disease anywhere. Thus at least fifty thousand experi-

ments made in Tampico, Vera Cruz, and New Orleans, not to name other places, produced no proofs of personal or other kinds of contagion, though in both the first-named places yellow fever prevailed moderately among the residents not acclimated.

"The Board of Health of New Orleans, in an official announcement, shows that for a month, beginning 26th November, 1853, 6,707 passengers from foreign parts, chiefly emigrants, had arrived at our wharves in forty-seven sea-going vessels, by the river route. Now, if we add the number which had previously arrived to the number which has since arrived from sea, the aggregate will scarcely fall below 10,000, while by other routes, chiefly by the river, the emigrants, absentees, and other unacclimated persons, as the steamboat population, coming to the city in September, October, November, and December, 40,000 more may be added, making 50,000—50,000 experiments against possible contagion—50,000 exposures to all the possible sources of contagion—the houses, goods, etc., of persons recently dead, including emanations from the sick and dying during the decline of the epidemic and during the whole of this period—all proving harmless.

"If yellow fever be contagious or transportable, why has it not been carried beyond the tropic of Capricorn during centuries of active intercommunication? Why did it appear only north of the equator, with two or three exceptions, always near the line, until 1850, when it travelled for the first time to Rio de Janeiro, which, however, is within the tropic?

"Such vast, yet significant experiments, quite overthrow those few cases where the opening of a box or bale of goods is followed by yellow fever—mere coincidents, not causes. There is not the least reason to think that the world, combined for the purpose, could create an epidemic of yellow fever, or even a single case in any city, street, or house upon the globe."

Such is the emphatic language of Dr. Bennet Dowler of New Orleans, whose integrity of character, extraordinary familiarity with the literature of the subject, and long personal experince in yellow fever, give a weight to his authority that few are entitled to. His facts at least settle one point, viz.: that, if portable or contagious at all, yellow fever *is not so in all of its forms.* The conclusion remains that yellow fever presents itself at different times under two distinct types, or in forms so modified as to make it portable at one time and not at another.

Whether the *materies morbi* be of *domestic* or *exotic origin*, is to my mind a question of no great *practical* importance. The two facts may be equally true and yet not at all incompatible. No one doubts that small-pox and scarlet fever are imported diseases, and that they are *still portable.* Yellow fever, from time to time, comes to the United States from the tropic as does cholera from the Old World. Small-pox and typhoid fever continue to come in the same way. These diseases have planted their germs in our soil, which spring up from time to time, reproduce their kind and spread far and wide.

It is equally well proven that the germ of yellow fever lies dormant in our Gulf cities for an indefinite period, and then, like scarlet fever, measles, etc., springs into life.

And why should this not be so? The climate of our Gulf coast is almost tropical, and where the germ of yellow fever finds all the conditions necessary for its permanent existence, just as do the insects, plants, and animals of the West Indies. We frequently witness instances both of "domestic origin" and of "importation" of yellow fever, and I regard both facts equally well established, to say nothing of the *epidemic wave* that travels by its inherent force, independently of transportation.

That yellow fever should be at one time *portable* and at another *not* portable, if true, is a fact in the present state of our knowledge inexplicable, but there are contradictory facts attending other diseases which are acknowledged to be contagious and portable, that are equally inexplicable. In a city of 100,000 inhabitants, any number of cases, from one to ten thousand, may occur of scarlet fever, measles, whooping cough, typhoid fever, etc., during an autumn, and no one can assign a reason why the disease should stop at any particular point in such a long scale. Before the discovery of vaccine, there was a certain proportion of persons to escape during the most violent epidemic of small-pox, and a small fraction in every town would be proof against the virus in any form through life.

Each of the above diseases, though perhaps never free entirely from contagion, differs greatly in this characteristic at different times and places.

I have shown yellow fever to possess several anomalous characters, and on this point of portability it may present an *extreme of the law of variability.* It is just as easy to understand how yellow fever should at one time be portable and at another absolutely not portable, as to understand the degrees, above alluded to, in other diseases, running from intense contagiousness to the very verge, on the other hand, of non-contagiousness.

QUARANTINE.

Having advocated the *portability* of yellow fever, it is needless to say anything touching the necessity of quarantine. The history of quarantine in the harbor of New York in 1856, and both in New York and Philadelphia in 1870, seems to demonstrate satisfactorily that yel-

low fever, to say the least, may *sometimes* be arrested in its march towards the hearts of our cities; but it is by no means demonstrated that this happy result can be *always* attained. On the contrary, on our Atlantic coast, as on the coast of the Mediterranean, it comes from time to time in one of those immense waves that knows no bounds and stops at no impediments. Yellow fever is, *par excellence*, a disease of tropical regions and countries in their immediate vicinity, yet it breaks over its boundaries occasionally and floods regions beyond. The distance to which the disease extends seems to depend much upon the strength of the wave—it first strikes the Gulf, and *generally* goes no further. Occasionally it will break over the peninsula of Florida, and reach Savannah and Charleston. In 1855, after many years of immunity, it struck Norfolk with full force, and only a few little ripples, as in 1853, 1856, 1870, have, for half a century, reached the Delaware river and the bay of New York.

Now, when we escape a *great* epidemic wave, we can by means of quarantine erect a bulwark against *vessels that come freighted with the materies morbi* from the yellow-fever zone. But if an epidemic, like that in 1853, 1854, and 1855, which devastated the sea coast of ten States, and ran up their rivers 500 and 1,000 miles, should come in full force against our northern shores we should doubtless see a repetition of what occurred in Philadelphia, New York, and our other cities from 1793 to 1805.

War, with all its evils, contributes in many ways to the advance of science, and in no country have army and navy officers worked more faithfully in the good cause than in ours. The history of quarantine during the late war in Southern ports, and statistics of their diseases, etc., have been admirably written and preserved by the United States medical officers. The reports of Dr. Elisha Harris on the hygiene of New Orleans, and the reports of the War Department on the medical history of the army during the war, and of the yellow-fever epidemic of 1867, are full of instruction.

But, replete as these documents are with truthful and important facts, I think they are not free from unwarranted conclusions, which from their practical importance ought not to pass without comment. General Butler, the reports from the War Department, and that of Dr. Elisha Harris lay great stress upon the rigid military quarantine and

sanitary measures in protecting New Orleans against the prevalence of yellow fever in 1862–5.

The facts do not, in my humble opinion, justify their conclusions, and I deem it the more important to call attention to the subject, as a writer so distinguished and so cautious as Dr. Austin Flint, in his *Practice of Physic*, has adopted these conclusions. In speaking of drainage, sewerage, etc., in the prevention of yellow-fever epidemics, Dr. Flint says: "This was illustrated by the exemption of New Orleans from yellow fever under military administration during the late civil war." I have already shown that yellow-fever, like other epidemic diseases, has its periods of *activity* and of *repose*. Our war followed a period of unprecedented epidemic activity, and was naturally followed by a corresponding one of inactivity.

Although New Orleans has had an average of one epidemic in every two years from the first one in 1796 up to the military occupation in 1862, yet their recurrence was so irregular that several intervals occurred of three, four, or even five years—viz., from 1805 to 1808, 1813 to 1816, 1848 to 1852; for the slight mortality in 1848 and 1849 scarcely justifies the designation of epidemics. And to the list must be added the three years which immediately preceded the military occupation of the city. During these years the yellow-fever mortality was less than for any other three years of which we have any authentic records—viz., ninety-one deaths in 1859, fifteen in 1860, and not a single death for 1861, the year immediately preceding the occupation!

These facts are taken by Dr. Chaillé, of New Orleans, from the only tables in existence which have been used by all writers. The facts I have pointed out have been overlooked by the army writers on quarantine.

The above facts show that New Orleans was more exempt, with all its filth, want of sanitary measures, and absence of quarantine for the three years immediately preceding the war, than it was during the military occupation, with its "impregnable quarantine," and a policing which made it the "cleanest city ever seen on the continent." La Roche, in his exhaustive history of yellow-fever, enumerates many instances where, in the very centre of the yellow-fever zone, the disease lay dormant five, ten, twenty or more years. "In Vera Cruz, the fever, now so prevalent, did not appear from 1776 to 1794. In Brazil the disease appeared in 1687–90. From that time we hear nothing of it in that

country until 1849–50, etc. * * * In fact there is scarcely any locality within the tropics where the fever does not intermit during periods of greater or less extent."

New Orleans is within the yellow-fever zone, and however useful quarantine may be in more northern latitudes, I think that Dr. Chaillé, in his brochure, "Life and Death in New Orleans from 1787 to 1869," has shown conclusively that it never has, at any time under the most rigid enforcement, had any effect in keeping out yellow fever from that city. There had been nineteen years of quarantine between 1796 and 1870, and Dr. Stone, Dr. Dowler, and other leading physicians, have borne the same testimony. When then we look calmly at the facts, taking into consideration the unprecedented fatality of yellow fever in 1853–4–5 and '8, years so little removed from the war, and *the unprecedented exemption during the three years immediately preceding the war*, and that this exemption continued without interruption (only a few cases during military rule) up to 1867, we can come to no other conclusion than that the years of exemption were only the usual *calm after a storm*. There never had been such mortality as in 1853–4–5 and '8, and never such exemption as in 1859–60–61, a commencing calm which extended through the war, and *two years* beyond, to 1867.

The history of Mobile, about one hundred and fifty miles from New Orleans on the coast, is interesting in connection with New Orleans. Yellow fever had visited this point long before it did New Orleans, and during the present century it has been a great sufferer, the disease having appeared there in epidemic form in 1819, '25, '29, '37, '39, '42, '43, '47, '53, '57, '67. All of these epidemics, after the one of 1829, I witnessed myself. The epidemic of '53 was terrible—that of '57 was mild, also that of '67. We here have an interesting parallel with the history of New Orleans. In the latter city, from 1858 to '67, there was no epidemic, and during the same period, but commencing one year earlier (1867), there was no epidemic in Mobile, and *not a single case during the entire war*, though blockade runners were coming in every week, and neither before nor after the war was there quarantine deserving the name. During the war, too, Mobile was crowded with troops and war material—policing was entirely neglected—all assignable causes for yellow fever existed in their most aggravated forms, and yet, as in New Orleans, the disease did not come.

The sanitary condition of New Orleans, except the four years from 1862 to 1865, Dr. Chaillè informs us, "has been one long disgusting story of stagnant drainage, foul sewerage, etc." With an alluvial soil six hundred feet deep, and rich in decomposing animal and vegetable matters—with a surface as level as a floor, and with the water percolating from below up to the surface when the river is high, it is difficult to see how any sewerage, drainage, or sanitary measures, could make a state of things at all satisfactory. Even during the military occupation, Dr. Warren Stone tells us, the suburbs of the city were never in a more filthy condition.

But there are other points in these reports deserving notice.

Dr. Fenner informs us that he saw near St. Mary's market in July, 1862, one well marked, fatal case of yellow fever, *imported from Key West*, and says there were doubtless others which were ignored, for fear of panic among the troops.

In 1863, the official records of the *civil population* report only two deaths by yellow fever—September 6th and 20th. Dr. Harris, however, informs us that "nearly *one hundred cases* of fever occurred in the river fleet and naval hospital that season. The history of all the cases showed they were *not of imported origin.* They nearly all occurred in crowded, filthy, unventilated gunboats, *that were at anchor in the river at New Orleans*;" "that from 4th July, 1863, to September 10, 1865, the Pizarro was the only vessel at quarantine which brought yellow fever from any other place than New Orleans. She was ordered into quarantine *while on the way up the river*, 4th July, 1863, with fifteen cases on board."

In 1864, official records report six deaths of citizens by yellow fever. Dr. Harris says:

"In 1864 there were five undoubted fatal cases of yellow fever, terminating in black vomit. They occurred in persons who resided, or daily visited, in the vicinity of the Naval Hospital."

"Notwithstanding the most rigid quarantine and protection against communication with infected vessels, more than 200 cases occurred in twenty-five vessels and iron-clad gun-boats, of which 57 died. *All these cases originated in the locality and had no connection with importation.*"

On the other hand Dr. Fenner, in speaking of the "impregnable quarantine," says:

"In this Dr. Harris was misinformed. *Vessels of war were* rigidly quarantined, but

those of transportation *were not. Military necessity* sometimes required their admission at all hazards, and thus the disease *was introduced on several occasions.*"

Dr. Fajet, also, who is good authority, and was present the whole time, reports:

"La quarantine n'a existè cette année, 1864, *que contre la marine marchande-il a été nulle pour la marine militaire.*"

In the face of these opposing facts, two questions come up that cannot be answered. 1st. Was the *materies morbi imported or not.* 2d. If not imported, was it generated *de novo* in the holds of vessels, or did it spring into activity from germs that had found their way into the vessels?

Still another important question comes up. If 200 cases of yellow fever occurred in 25 vessels, anchored in the river, what prevented the disease being "*wafted to the shores,*" if winds can do it in the harbor of New York? The facts here given are only another proof that winds *do not* influence the dissemination of yellow fever.

The facts detailed by Dr. Elisha Harris show that 200 cases of yellow fever occurred, of whom 57 died, in 1864. All these cases originated in the shipping, and *six of them died in the Charity Hospital.* It is contended that the city was saved from an epidemic by the thorough sanitary measures that were enforced.

Now let us call attention to facts on the opposite side of the question, to show how difficult it is to rely on negative evidence. In 1857, five years previous to the military occupation of New Orleans, yellow fever broke out in and around New Levee and Girod streets, near the *Naval Hospital of* 1864. It was confined to a very limited spot, in which only about five hundred cases occurred, of whom two hundred died. By official report this part of the city was in the best possible sanitary condition, while the general lack of cleanliness was such as "would be shocking to the eyes of one accustomed to the filth of Constantinople or Cairo." Streets uncleaned for weeks together, two of the largest hotels pouring the contents of their privies into one of the main thoroughfares of the city, with the ceaseless resources of the Charity Hospital swelling the stifling current, gutters choking with filth, or else emptying themselves by municipal authority into vacant lots and unpaved streets, canals seething and bubbling with their putrid waters, were the customary spectacles greeting the senses in all quarters; and

yet the fever appeared and lingered, with occasional exceptions, in a portion of the city which, in the language of the Mayor, presented "an unexceptionably clean condition." "If infectiousness were a property resulting from filth and putrescent organic matter, the *whole city* was a laboratory for its generation, unsurpassed in magnitude and extent, and yet over its entire length and breadth the fever was confined to a narrow strip presenting an exception to the general aspect of immundicity." Under such local conditions, only some two hundred deaths occurred, which indicates not less than five hundred cases, each producing contagion, say some; or endless quantities of fomites, say others; and yet when five hundred manufactories did not produce an epidemic in the city, which was as filthy as described, and contained so many unacclimated that in the very next year, 1858, the yellow fever carried to their graves 4,855 victims."

"If a sanitary police saved us in 1864 and other war years, what saved us in 1857 and other non-epidemic years before and since the war?"—*Chaillé.*

This paragraph affords a curious illustration of a fact I have asserted elsewhere, *that epidemic yellow fever will often confine itself to one part of a town, then hibernate and resume its work the next season.* This fact often characterizes it in towns, as well as in its great migrations from State to State.

In conclusion, then, I must say I find no evidence in the several army reports to prove that the military occupation of New Orleans had anything to do with the comparative exemption of that city from yellow fever in 1862 to 1865. These years of exemption *happened to fall in the middle of one of those periods of repose* which usually follow several years of great epidemic activity. If I am wrong in any fact or conclusion, I shall be most happy to be corrected. I have not alluded to these reports in a spirit of controversy, but simply with the view of bringing back the professional mind to the true state of the case. If we are ever to arrive at any solid conclusions respecting the natural history of yellow fever, it can only be by deductions from well ascertained facts.

RECENT EPIDEMICS IN MOBILE, NEW YORK, AND PHILADELPHIA.

Having, as fully as the space will permit, discussed the several points in the history of yellow fever that I deem the most important, I propose now to call attention to a collection of evidence in confirmation of

the opinions expressed. The facts I am about to present are taken from the history of yellow fever as it appeared in Mobile in 1853, to which I was myself a witness, and the others are drawn from the printed reports on the fever in New York harbor in 1856 and 1870, and in our sister city, of Philadelphia, 1870.

I have selected these examples because they are of recent date—are familiar to our own faculty, and although they corroborate in a remarkable degree the positions I have taken, I cannot be charged with hunting up old and doubtful material, or of presenting garbled facts. Each of the four examples I have brought forward is a perfect picture in itself, and they all converge to the same conclusions.

EPIDEMIC OF 1853 IN MOBILE.

In August, 1853, the "great epidemic" which started from Rio de Janeiro in January, 1850, struck six of our States on the Gulf. Mobile received the shock in full force, and with the exception perhaps of 1819, when one half the population that stood their ground, consisting of Spaniards, Negroes, Indians, French, Americans, and mixed bloods, were carried to the grave, the year 1853 was the most fatal ever known.

From Mobile the epidemic, *magna pars fui*, extended up the rivers, railroad, and to many points around the town to which it had never gone before. The accompanying map will show the principal localities to which I shall allude. (*See Map.*)

Mobile is situated on the head of the Bay, at the mouth of the Mobile river, which branches fifty miles above into the Alabama and Tombigbee rivers. It is 400 miles from Mobile by the river to Montgomery on the Alabama, and nearly the same to Demopolis on the Tombigbee, each of which towns was the terminus of navigation on its respective river. Grove Hill, a small village of two or three hundred inhabitants, is situate on the elevated, dry, barren ridge, several hundred feet high, which lies between the two rivers, and *fifteen miles from the nearest point on either*. The Mobile and Ohio Railroad in 1853 was completed only to the little summer retreat, Citronelle, thirty-three miles, which, on a hill 400 feet high, is one of the most elevated and healthiest spots between Mobile and the mouth of the Ohio river. Spring Hill is another elevated summer retreat, seven miles from Mobile on the west.

The disease extended out to Spring Hill and around Mobile in every direction for six or eight miles. It also went out thirty-three miles to Citronelle, the terminus of the railroad. It moreover went to every point on the Alabama and Tombigbee rivers, between Mobile and the towns of Montgomery and Demopolis, the two termini of navigation at that time. And, to the utter amazement of everybody, it broke out at Grove Hill, *fifteen miles from any boat landing*, on the high dividing ridge, with which there is no communication except by the common rugged wagon roads. From Grove Hill to the rivers there were only scattered houses, few and far between.

On account of the lowness of the rivers the boats could not get up to small towns above Montgomery and Demopolis, to which they usually go in more favorable conditions of navigation, and from the fact that yellow fever did go to every point which the steamboats reached, the conclusion is natural that if they could have gone on to other towns they would, in like manner, have carried the disease on with them and turned it loose.

But how did yellow fever find its way to such an isolated spot as Grove Hill? The explanation is this: A man by the name of Hiram Powers, commonly called Judge Powers, was residing in Mobile with his wife and a large family of children at the time the epidemic broke out. He was taken with the disease and died with black vomit. His family, terror-stricken, determined to fly, and accordingly packed up their goods and chattels in trunks and boxes, went up on a steamer to the landing nearest Grove Hill, and from there out by wagons to the village.

A day or two after they arrived in the village one of the daughters sickened and died with black vomit. A young friend who kindly came to nurse her from the village also sickened and died. Other members of the Powers family and a number of the villagers shared the same fate, from the spreading of the fever over the village.

I have not been able to procure any reliable statistics as to population, number of cases and deaths, but the disease was of the most malignant character, and the main facts are perfectly authenticated.

No evidence, I think, could be more complete to establish the portability of a disease. All facts being opposed to its contagiousness, I can come to but one conclusion, viz., that the germ may be closed up in

trunks or boxes, or be shut up in the baggage car of a railroad, transported from one point to another (as from Mobile to Grove Hill and Citronelle), and turned loose to propagate and do its work of destruction.

The disease was equally fatal at Citronelle and Spring Hill.

Contagionists will doubtless regard this as a case of communication by contagion, but from the facts that I have never seen anybody communicate the disease where baggage was not taken with the patient, and that the disease generally goes everywhere that steamboats go from our infected ports in epidemic years, I see no other conclusion than the one I have before given, viz.: that the germ is carried closed up with baggage, and not generated and communicated by personal contagion.

I will add one more practical fact, to which I attach importance. About fifteen years ago there was an epidemic of yellow fever in Mobile, which extended out seven miles and attacked the family of Mr. John Battle at his country residence. During the winter his establishment was purchased by Mr. Hilliary Foster, another of my personal friends and constituents. He took occasion to make some alterations in the out-buildings, amongst others a long single story wooden house, which he caused to be raised from the ground in order to place elevated brick supports under it. The floors were within a foot of the ground, and the lower timbers so much decayed that they had to be replaced by others. Besides the rotten timbers a great deal of filth and trash was raked out, piled up near by and exposed to the sun. I expressed my fears at the time, and they were fully realized by the breaking out of yellow fever in the family, several of whom were very ill, and Mr. Foster died with black vomit.

There were a few sporadic cases in Mobile that year, seven miles off, but none in the country, or between the residence of Mr. Foster and the town, and my conviction was at the time that the *germ had been left in the accumulated trash beneath the house, and was brought into activity by exposure to the sun* the succeeding year. With this and other similar facts strongly impressed on my memory, I should be much inclined to put fire to "Rotten Row," in which the fever started last summer on Governor's Island.

YELLOW FEVER IN NEW YORK HARBOR IN 1856.

The history of this epidemic has been very fully and faithfully given in the Report of Dr. Elisha Harris, at that time physician to the Marine Hospital. The following are the leading facts:

In 1856, between 10th April and 4th October, seventy-nine infected vessels, from infected ports, arrived in the bay of New York, and anchored for four miles above and below the Narrows, between Long Island and Staten Island—from Gravesend Bay to within a short distance of New Brighton. The point of anchorage of every infected vessel is accurately marked on the map of Dr. Harris. (*See Map.*)

All of the seventy-nine vessels had had cases of yellow fever on board, and a glance at the map, which is accurately colored, will show the extent and exact limits of the yellow fever on each shore. The yellow coloring on the chart shows that the *fever extended along the borders of each island opposite the line of infected vessels and no farther*, except one spot on the south side of Governor's Island, and another about opposite, on the Jersey shore. The shipping nowhere approached these two last points nearer than two miles and a half. The disease was much more continuous along the Long Island than the Staten Island shore.

With this map before him, I do not see how any one can resist the conclusion, that the yellow fever was communicated by the infected vessels to the population residing along the two shores which faced this line of vessels. The disease ran up on Long Island to the very suburbs of Brooklyn, but no further; while on the opposite shore it did not come inside of Quarantine, except at the little spot on the Jersey shore mentioned above. Can any one doubt, after examining carefully the facts, that if these vessels had been allowed to go up to the wharves of New York city and Brooklyn, these cities would have been desolated by yellow fever? How the disease was communicated to Governor's Island is a question difficult to answer. It may have been through the *epidemic force* of the disease, or through illicit intercourse with the Island, by which the *materies morbi* was carried there. This erratic mode of propagation is characteristic of all epidemic diseases.

Dr. Harris informs me that some scattering cases occurred in the

town of Brooklyn, among persons who had been exposed to sources of infection outside; but no cases originated in this city or New York.

"*Report on the Yellow Fever on Governor's Island, New York Harbor, during the summer and fall of* 1856," *by* L. Guild, *Assistant Surgeon, U.S.A.*

The report of Dr. Elisha Harris, to which I have referred above, respecting the yellow fever in New York Harbor in 1856, though very full on every other point, gives no particulars respecting its history on Governor's Island that year, and the interesting report of Surgeon Guild very fully fills that void.

The first case of yellow fever occurred on the Island 29th July, and the report is not very complete, as Surgeon Guild did not take charge of the post before the 5th September, up to which the details had not been well recorded. "At this time," says Surgeon G., "yellow fever was prevailing at Fort Hamilton, at Brooklyn and its environs, and Governor's Island."

Dr. Elisha Harris informs me that there is one grave error in this statement, viz.: with regard to the *existence of the fever in Brooklyn*, Dr. H. investigated and recorded the facts at the time with great care, had a colored map made representing every spot occupied by the disease, and from this map it is clear that, although the disease extended all along the Long Island shore, from Fort Hamilton to Greenwood, it did not touch the city of Brooklyn or approach within two miles of Governor's Island.

"*As the disease was almost exclusively confined to certain localities very much restricted in limits*, it is proper for a full understanding of the circumstances attending its prevalence, that I should give briefly the topographical and meteorological conditions of the Island during the epidemic. Governor's Island, in latitude 40° 42', longitude 74° 9', is situated in New York Harbor, at the junction of the North and East rivers with the bay, and is about twenty-two feet above low water mark. The city of Brooklyn encircles almost half the Island, and lies in an easterly and southerly direction, separated by an arm of the bay, measuring in its narrowest part not more than one quarter of a mile, and in its widest one half of a mile. To the north of the Island is the city of New York, about one mile distant. Six or seven miles distant, in a south-south-westerly direction, are situated Fort Hamilton and the Quarantine grounds. The Island is almost circular in form, about one mile in circumference, and consists of alluvial soil. The soil is very fertile, and the growth of vegetables and grass is abundant and luxuriant. Fort Columbus, the main fortification on the Island, is placed upon the northern side, about two

hundred feet from the water's edge, and from this fort, in every direction to the water, there is a regular artificial slope, affording so perfect a drainage that pools of stagnant water are never known upon any portion of the Island. The main work communicates, by a covered way, with Castle William, which stands boldly out upon the extreme north-western point of the island, and the base of which is washed by the waves of the bay. These two works have spacious quarters for the men, and are garrisoned by a large portion of the men stationed here. On the southern portion of the Island is located another fortification of smaller dimensions, known as South Battery, and occupied by the music boys, numbering about seventy, and by one or two soldiers' families. Near the South Battery, and to its east, stands the hospital, and in close proximity to the hospital is a row of old dilapidated frame tenements occupied by soldiers' families, and familiarly known as "Rotten Row." South Battery, the hospital, and Rotten Row are located near the water, occupying the nearest position to the city of Brooklyn, and the most exposed of any other portion of the Island to the south-easterly, southerly, and south-westerly winds. From this position we have an extensive and uninterrupted view of the bay to the south in the direction of Quarantine, Fort Hamilton, and the south-western portion of Brooklyn; and no objects intervene to obstruct the southerly and south-westerly winds." * * * "On the 29th July, the first case of yellow fever occurred in a resident of Rotten Row—she died with black vomit 2d August. On 1st August, three other cases occurred, one in Rotten Row and two from South Battery; and in these two places the disease fixed its abode, as it were, almost exclusively, and continued until the number of cases amounted to sixty-three, fifteen of whom died, 1 in 4.2. Very few cases occurred on other parts of the Island, besides South Battery and Rotten Row, and those that did thus occur were in almost every instance" (probably all) "in persons who were in the habit of visiting Rotten Row.

"In South Battery the disease continued its ravages until early in September, when the occupants were removed to quarters in another portion of the Island, *only two cases occurring among them after their removal. In Rotten Row it lingered until checked by cool weather on the 9th of October.*"

Again, Surgeon Guild says: "With regard to its existence in this garrison, there is satisfactory evidence of its not having been generated on the island, but that its origin was in our vicinity, either on shipboard or on land, and that its causes, whatever they are, being thus eliminated in our neighborhood, were wafted to us by the winds." After referring to the admirable policing of the island under Major Backus, Surgeon Guild continues: "The only locality within the limits of this post at all suspicious of having given rise to the disease *ab initio*, is that excrescence of the island, Rotten Row. It is an old wooden shell of a building, with many inmates, and affords more filth than all the rest of the island besides; but the fact of the disease having prevailed among the occupants of one side of the building, to the perfect exclusion of its occupants on the other side, is full of significance, and entirely dismisses from my mind the idea that the epidemic could have had a local origin in Rotten Row. The building is of an oblong rectangular shape, divided in its longitudinal diameter by a thin board partition, and on each side of this partition are rooms, the doors and windows of which on one side front to the S.S.W., and those of the other to the N.N.E. The inhabitants on the side opening to the S.S.W. suffered severely, scarcely one escaping an attack, whilst those on the

N.N.E. side enjoyed the most perfect immunity. The habits and occupations of these individuals were the same, and if the disease had originated in Rotten Row they should most assuredly have been equally liable to an attack."

Now, the above extracts are of peculiar interest to me, as an example of an honest statement of simple facts by an intelligent man, followed by false conclusions from the want of more extended observation. The facts in most of the instances seem to warrant the above conclusions, which would doubtless be quite satisfactory to most readers not familiar with the habits of the disease. He is clearly right on the question of contagion, as no contagious disease could attack all the patients in the rooms on one side of a long house of this kind, and be prevented by a thin board partition from extending to those on the opposite side. Such instances are not rare in yellow-fever epidemics; this disease passes around houses here and there in a town—travels often along one side of a street, and has been known to attack all the sailors in the berths on one side of a man-of-war, while those on the opposite side escaped. I know of no plausible explanation, except that afforded by the insect hypothesis, for such vagaries as these. The progress of yellow fever has been stopped by a ditch and moat, and often by a wall. The Calaboose prisoners in New Orleans almost always escape during yellow fever epidemics, for no other reason that can be assigned than its wall-enclosure.

The statement of Surgeon Guild with regard to the influence of winds are to my mind wholly unsatisfactory—first, because the winds, blowing during two months from all points of the compass, ought not to have brought the disease from a distance to Governor's Island, and then have no power to scatter it over an island only five hundred yards in diameter. We are distinctly informed that it was limited to a small portion of the Island. The same fact was repeated on Governor's Island last year, and is characteristic of yellow fever in all times and places. Moreover, the disease in 1856 only reached along the Long Island shore to the southern suburb of Brooklyn, and did not invade the part of the city opposite the Island, and the same winds which carried the disease (as he supposes) to Governor's Island, should have scattered it through at least two miles of Brooklyn, directly in the course of the winds, and nearer to the infection than the Island.

An additional proof of the non-contagiousness of the disease is seen

in the fact, that after the removal of the occupants of South Battery to quarters in another portion of the Island "only two cases occurred among them after their removal. In Rotten Row it lingered until checked by cool weather, 9th October."

Again, the evidence is not conclusive that it might not have "originated" on the Island, although, from all the facts, I do not think it did. The *materies morbi* might have been lying dormant in Rotten Row from some previous importation, as there is ample reason to believe that it may linger about a spot, or in the hold of a vessel, and then be called out by proper exciting causes. It was probably carried to Governor's Island on that occasion by epidemic force, from the foci in the shipping.

Again, "All agree that yellow fever can be generated on board of vessels. Whether the morbific agency depend upon decomposing timbers, the bilge-water, the putrifying cargo, or what not, still the fact is beyond a doubt that the disease can be so produced." Now, if by the term "generated" is meant the production of the *materies morbi*, *de novo*, the assertion is by no means proven. All the above causes existed for a long period south of the tropics in America before yellow fever appeared there; and on the east coast of Africa and in China and India, where climate and ships have afforded all the supposed conditions necessary, yellow fever is unknown. Wherever yellow fever occurs on shipboard, a strict investigation will show that such vessels have, perhaps without exception, at some previous time been in a yellow-fever port, where the germ may have been introduced and lay dormant till proper exciting causes were applied.

YELLOW FEVER IN PHILADELPHIA IN 1870.

After I had almost completed my report, Dr. Stephen Smith very kindly furnished me with the very interesting reports of H. E. Goodman, Port Physician, and J. Howard Taylor, Lazaretto Physician, on the yellow fever which occurred at the Lazaretto and in the Swanson street district in the city of Philadelphia, July, August, and September, 1870. The facts are so conclusive that no one can doubt as to the importation of the disease and its spread as an epidemic at the Lazaretto, whatever doubts may exist with regard to its origin in the city.

It appears that the brig Home, on a voyage from Jamaica, after

losing her captain at sea on June 24 with yellow fever, arrived at quarantine ground on the 29th, was placed under quarantine, and cast anchor four hundred yards out, opposite pier of Lazaretto station. Her crew consisted of mate, nine men, one colored boy, and a passenger from Kingston. The Board of Health, 30th June, passed a resolution ordering the brig to be cleaned, fumigated, and disinfected, and the owners notified to discharge cargo. Several of the crew sickened and died with yellow fever, and on the 7th July the remainder were allowed to go to the city, and four of these were traced to sailors' boarding houses, 511 and 833 Swanson street. The hatches were opened on the 13th or 14th July, and on the 15th she went up to Government wharf to facilitate the unloading, "and from this time the epidemic may be said to have fairly commenced." July 19 the discharge of the cargo was finished.

The total population exposed to the influence of the brig Home was 103, including crews of Home and barges, stevedores, Miller and Pepper families, doctors, undertakers, visitors who stayed over night, nurses, and those of the Lazaretto proper; 17 were colored, 86 white. Of colored, one had yellow fever of mild type; of the white 30 had genuine yellow fever, and 15 mild fevers. The Pepper family, thirteen in number, who lived 140 yards distant from the pier, all had fever. Dr. Thomson's family, four in number, had three cases, also at 140 yards distance from the Home.

The first case in the Swanson street district sickened on the 8th of August and died on the 12th. From the 8th of August to the 8th of September 17 cases occurred here, of whom only four recovered. This part of the city, according to the reports, was in very filthy condition, and rigid sanitary measures, cleansing, disinfecting, etc., were put in force, after which there was no further spread of the disease.

A review of the preceding facts shows that there was a decided and malignant epidemic of yellow fever at the Lazaretto, and that all it wanted was material to act upon. It can hardly be doubted that if the Home and its barges had been allowed to go to the city wharf, and to remain there while the cargo was discharging, there would have been a widespread and fatal epidemic.

It may be asked, on the other hand, why the disease did not become general after getting a foothold in the Swanson street district? I con-

fess that this is a question to which a positive answer cannot be given, for two reasons—1. Yellow fever not unfrequently will confine itself to a single locality where no sanitary measures are taken to arrest its progress. This I have repeatedly seen in our Gulf cities, and the literature of the subject is full of such examples. 2. The facts adduced on various occasions to prove the controlling influence of sanitary measures in preventing the spread of disease are not conclusive. The disease, in its epidemic form, as was the case in 1853, may traverse half a dozen States in a few months, without any respect to topography, winds, cleanliness, or any other appreciable influence, showing the same virulence on the arid, clean hill-top as in the filthy alleys of a city.

An important question next arises as to the origin of the yellow fever in 1870 in the Swanson street district. Was it of local or of exotic origin?

Now, although the facts are inconclusive as to its derivation from the brig Home, the argument to my mind is strongly in favor of this opinion. I do not believe that yellow fever would have been heard of had this vessel not brought and propagated it in the vicinity. The fever did not show itself in the Swanson street district until six weeks after the infected vessel had begun to spread the disease around the Lazaretto, in the barges, etc. It is true that we cannot trace the disease from the infected vessel, except that, on the 7th of July, four of the crew of the Home left the vessel and went to sailors' boarding-houses 511 and 833 Swanson street. Of these four only one, Oliver Piere, had yellow fever. He was taken sick on the 8th at 511, and died at 833 with black vomit on 12th July.

Other cases were carried from the barges and infected Lazaretto grounds to different points in the city without communicating the disease, but this is only one of the indisputable proofs of the non-contagiousness of the disease, in the proper acceptation of the term. But portability and the contagiousness are two different questions. I have shown, in my account of yellow fever in Alabama in 1853, that the disease may be carried in trunks, and the germ turned loose at a distant point to propagate and do its work of destruction. What evidence have we that the disease-germ may not have been carried in this way to Swanson street, by persons from the Home itself, or from the barges engaged in discharging her cargo? There was little or no restriction

placed upon the movements of those who had free communication with the infected vessels. The erratic manner in which all epidemic and contagious diseases skip about from place to place is often beyond the strictest scrutiny. Who can follow the footsteps of cholera, scarlatina, measles, or even small pox?

CONCLUSION.

As before remarked, I have nothing to add to the sanitary measures already devised and so energetically enforced in our city and harbor, and will merely take the liberty of making a passing suggestion for what it may be worth, in connection with disinfectants.

I am not aware of the existence of satisfactory proofs that we possess any *chemical* disinfectant that can be relied upon to eradicate the *materies morbi* from the hold of a vessel, and will, therefore, pass them by.

Extremes of temperature, whether heat or cold, would seem, however, to have a controlling influence over this poison. Dry heat, carried to 200° or more, has given satisfactory results, and the same may be said of steam. But on this subject I take much pleasure in referring to the several publications of Dr. Elisha Harris, on sanitary measures, and particularly to his paper on "The utility and application of heat as a disinfectant," in which it will be found fully and ably handled.

On the other hand, a temperature at or below the freezing point never fails to arrest the disease in its most vigorous epidemics. The only difficulty has been in devising cheap and convenient means of reducing the temperature of vessels and buildings sufficiently low to insure the object. Observation has shown that a "white frost," which may happen between 32° and 40°, is not sufficient to arrest yellow fever; but whenever the temperature falls to or below 32°, producing a sheet of ice, however thin, we have the certainty that the disease is put to rest.

In New Orleans the manufacture of ice by artificial means has been carried to such perfection that, if my information be correct, they are now competing successfully in the market with the ice companies of the North. I am ignorant of the process by which this degree of cold is produced, but if the apparatus employed can be made applicable to vessels, and at moderate expense, it seems to me it would be less objec-

tionable than the opposite extreme of temperature. A freezing temperature might affect the tropical fruits injuriously, but little else.

A vessel, cargo and all, if thus subjected for twelve hours or less to a low degree of cold, would be thoroughly disinfected. One frosty night is certainly sufficient, and one hour of freezing temperature would probably answer the purpose equally well.

RÉSUMÉ.

First.—Yellow fever, unless there be two distinct types of the disease, is not produced by marsh effluvia, or decomposing animal or vegetable matter.

Second.—It springs from a living germ that has the power of self-propagation.

Third.—The germ is not reproduced in the human system, and the disease therefore is not contagious.

Fourth.—The germ is portable by vessels, baggage cars of railroads, in trunks, boxes, etc., and possibly in exceptional cases about the persons of individuals.

Fifth.—The contradictory facts would seem to point to two distinct forms of yellow fever, one portable, the other not portable.

Sixth.—Yellow fever (more particularly in northern towns) usually commences in one or two limited points, near shipping, from which it spreads in the most gradual manner for a month or six weeks.

Seventh.—The disease is not influenced by winds in its rate of progress—is not conveyed to other parts of the town to which cases are taken; but extends by epidemic force, or its inherent mode of progression.

Eighth.—In the yellow-fever zone the occurrence of the disease has no appreciable connection with meteorological conditions of the atmosphere.

Ninth.—In northern towns elevated temperature (beyond the usual mean) is favorable to its outbreak and propagation; but the presence of an imported germ, or descendant of an imported germ, is necessary to its origin.

Tenth.—Yellow fever commences in an epidemic wave in the Gulf of Mexico, and the distance to which it extends northwards depends upon the force of the wave.

Eleventh.—These waves come at irregular intervals, and are characterized by periods of activity followed by periods of repose of very variable duration.

Twelfth.—Quarantine, or sanitary measures, have no power to arrest an epidemic wave.

Thirteenth.—The epidemic wave rarely extends as far as New York, and quarantine may, by forbidding the entrance of vessels freighted with the *materies morbi* into our harbor, prevent the outbreak and spread of the disease in the city.

Fourteenth.—To guard against dishonest violations of quarantine, it might be proper, if possible, to subject every vessel in the yellow-fever season, coming from the yellow-fever zone, to the influence of a temperature of at least 200°—or a temperature below 32°—both of which are effectual disinfectants.

Fifteenth.—Yellow fever after prevailing in one part of a town may hibernate and resume its work in the remainder of the town the following summer. In like manner it will hibernate during its extended migrations from State to State, and continue its interrupted march in summer, for a series of years, as did the Rio de Janeiro epidemic in 1850 to 1855, terminating in Norfolk.

Sixteenth.—Epidemic waves pay no respect to topography; they invade equally the moist low lands and the rocky, sandy, hill tops—the clean, healthy villages equally with the dirty alleys of cities—the palace and the hovel.

"K."

REPORT OF SANITARY COMMITTEE.

THE CARE OF PERSONS SICK WITH SMALL-POX.

NEW YORK, March 8, 1871.

In response to resolutions, "that the Sanitary Committee and the City Sanitary Inspector report at the next meeting of the Board what arrangements shall be made for the removal and transportation of small-pox patients and their delivery to the hospital; also as to the necessity of procuring a steamer for the transportation of such patients, and the probable expense of the same," the undersigned respectfully report:

That, although in their opinion, the present state of facts as to the prevalence of small-pox within this city does not warrant any undue alarm, the number of deaths occurring from small-pox since December the 19th last, and up to date, being by 50 per cent. or thereabout less than they were for the same length of time (say ten weeks) in 1869, or for only the first eight weeks of 1870, the laws of the State—chapter 74, section 16, of 1866, and chapter 956, section 3, of 1867—making it incumbent on this Board to provide for the detection, supervision, removal, and care of all cases of contagious, pestilential, and infectious diseases, and in particular small-pox, clothing this Board with all the powers requisite to meet any emergency arising and having relation thereto, it appears to be the plain duty of this Board to take and to keep charge of all such cases of contagious or infectious diseases, the

removal of which from dwellings and transportation to hospital is rendered necessary and has been ordered for want of proper isolation and means of treatment of the sick, or the protection of the life and health of others living near by, until the patients in question can have been safely lodged in the respective hospital or ward; and that even then and there the responsibility of this Board for the proper care and treatment of said patients does not cease, inasmuch as the laws aforesaid contain no provision authorizing this Board to confer part of the powers, duties, and obligations on any other Board, corporated body, or individuals with a view of becoming released thereby from its own responsibilities in the premises.

The hospitals or places of reception for persons afflicted with contagious diseases being, however, at the present day, and having been previous to the organization of this Department by the laws aforesaid, in charge and under the direction, partly of the Commissioners of Charities and Correction, and partly of the Health Officer, it is alike a delicate and difficult task for this Board to discharge in all cases and under all circumstances to their fullest extent the responsibilities imposed on it by law. No lack of willingness to co-operate, nor a want of courtesy can be charged on either the above-named Commissioners or the Health Officer, but they have, to the contrary, on all occasions been actuated by an accommodating and obliging spirit in their official intercourse with this Department and readily adopted or carried out any suggestions propounded to them. Yet, all this does not remove the anomalous state of facts, that this Board is by law held responsible for the care and management of institutions, or for the fate of patients treated therein, which through custom, if not by law, are not amenable to its immediate and direct control and supervision.

The undersigned having also been directed by a further resolution of this Board to make a report on these particular points, expected to be presented at its next meeting, they shall for the present confine themselves to such propositions, the practical effect of which can be secured at once, and to this end recommend the adoption of the following resolutions, to wit:

Resolved, That the Sanitary Committee and the City Sanitary Inspector are herewith directed to inquire into the state and condition of the ambulances used by this Department, for the removal to hospital of persons suffering from contagious diseases, and in

particular small-pox, with a view of having such alterations and improvements, if any, which in their opinion and judgment may be conducive to greater comfort and safety of the patients conveyed therein.

Resolved, That said ambulances, while on duty, shall be in charge of such Assistant Sanitary Inspector as may be designated to that end by the City Sanitary Inspector, and that the first-named shall personally attend to the removal, proper care, and protection of all patients.

Resolved, That the Assistant Sanitary Inspectors and other officers of this Board, or any of them, as the City Sanitary Inspector may direct, shall see every patient, removed under their charge, safely lodged at the respective hospital or ward, and placed in care of its attending physician.

Resolved, That inasmuch as a full compliance with the resolutions aforesaid can be insured only if a boat or steamer specially and exclusively destined and appointed for that purpose is at all times at the disposition of this Department, the Finance Committee is herewith directed, jointly with the Sanitary Committee and City Sanitary Inspector, to report at an early day on the means and ways of procuring such conveyance and its probable cost.

All of which is respectfully submitted.

Signed,

G. CECCARINI, M.D.,
MAGNUS GROSS,
STEPHEN SMITH, M.D., } *Sanitary Committee.*

MOREAU MORRIS, M.D.,
City Sanitary Inspector.

CARE OF CONTAGIOUS DISEASES.

NEW YORK, March 21, 1871.

The Sanitary Committee, to whom was referred the following resolution, viz.:

"*Resolved*, That the Sanitary Committee be and is hereby directed to examine the present methods of controlling the spread of contagious diseases, the care of the sick of such diseases transferred to hospitals, and the adaptation of such hospitals to the present and prospective wants of the city, and report what action this Board should take to render these measures more effective and improve the condition of hospitals devoted to the reception and care of contagious diseases,"

Respectfully report:

I. *The present methods of controlling the spread of contagious diseases.*

The sanitary care of contagious diseases must depend much upon the peculiarities of each individual disease. Some, like small-pox, scarlatina, measles, syphilis, etc., have their origin only in a specific poison generated by the sick and communicated to the well. Others, like typhus and typhoid fevers, may arise from a poison emanating from surrounding conditions, and afterward be propagated by a poison generated by the sick.

Of the essential nature of these poisons we know very little, but the phenomena of their development, diffusion, and destruction clearly indicate that they consist of matter in a state of minute division, and, under proper conditions of warmth and protection, they may be transported great distances, and preserved. It is evident that to control diseases propagated by specific poisons, we have to prevent the communication of such poisons to those susceptible to them. This may be accomplished—

1. By rendering the persons unsusceptible.
2. By isolating the sick.
3. By destroying the poisons.

Small-pox is the only disease that admits of control by rendering persons unsusceptible. Vaccination is the preventive measure, and, in the absence of compulsory laws, this Board has been able to enforce vaccination only by persuasion, in a house-to-house visitation by its medical officers.

The second measure of prevention, viz., *isolation of the sick*, has as yet been enforced by this Board only against typhus and relapsing fevers and small-pox. Two plans are pursued; first, isolation of the sick in their homes, when they were so situated as to admit of quarantine. In order to isolate patients in their homes, so as to prevent the spread of such diseases as typhus and relapsing fevers, small-pox, and scarlatina, measles, etc., there must be a room in which the sick may be separated from all intercourse with the well, and which does not ventilate into halls or passage ways used by others. Such accommodations are not very frequently found among the inhabitants of tenement

houses in New York. When it is impracticable to secure this isolation, the Board must resort to the *second* method, viz., *removal of the sick to hospital.* Great care is exercised in the selection of cases requiring removal from their homes, and the removal is made only in accordance with the following rule:

"Whenever two Sanitary Inepectors shall report in writing that any person is sick of any contagious or infectious disease, under such circumstances that the continuance of such sick person in the place where he or she is, is dangerous to the lives of other persons residing in the neighborhood, the City Sanitary Inspector shall, if he has reason to believe there is ground for so doing, in some manner cause the removal of such sick person to the hospitals under the charge of the Commissioners of Charities and Correction."

The removal is effected with as much attention to the comfort of the patient as possible, in ambulances, and the sick are delivered to the care of the Commissioners of Public Charities and Correction at the dock at Bellevue Hospital. The third method of prevention is, *destruction of the poison generated by the sick.* In accomplishing this object the most approved disinfectants are employed at once, and constantly, by skilled persons in the room of the sick and to all clothing liable to contain the contagious poison.

II. *The care of the sick of contagious diseases transferred to the hospital.*

An examination of the hospitals devoted to contagious diseases has convinced your Committee that, in their management and in the care of the sick, far too little regard is had for the sanitary requirements of these diseases. There is not that attention to the isolation of the sick nor to the care of their persons or clothing in the reception hospital at Bellevue, nor in transit to Blackwell's Island, nor on the Island, that is so absolutely necessary to prevent the spread of these diseases. The methods of disinfection for the destruction of the poisons generated in the hospitals are especially inadequate. In the case of infected clothing and of the bodies of the dead, in the police arrangements of the buildings and grounds, these hospitals are placed too much under the same general management as other hospitals.

While many of these sanitary defects have been promptly remedied by the Commissioners, it is still quite evident that while these special hospitals remain connected with and form part of a system of general

hospitals, the sanitary arrangements essential to their proper management will not be rigorously and constantly applied.

III. *The adaptation of the present hospitals for contagious diseases to the present and prospective wants of New York.*

The present hospitals for contagious diseases were located upon the southern extremity of Blackwell's Island upwards of fifteen years ago. At that time this location was very suitable for the purpose, both by its isolation and the facilities it afforded for transportation. Since that date, however, a large population has gathered upon the adjacent shores, and the surrounding waters have become great thoroughfares of travel. The island itself has become covered with large institutions, which have a resident population of upwards of seven thousand persons.

The proximity of this population renders the present location of these hospitals unfavorable for the isolation of contagious diseases if they are managed as general hospitals. Perhaps no place in the vicinity of New York is more conspicuously unsuited for a small-pox hospital at the present time than the southern extremity of Blackwell's Island, *provided no other safeguards are employed to prevent the spread of the disease than were formerly depended upon, viz., the separation of the sick from the well by a given distance.* But sanitary science teaches us that in disinfection we have a measure of prevention against the diffusion of contagions, more valuable and effective than distance. And although it will doubtless be expedient at no distant day to remove the present hospitals for contagious diseases to a more isolated position, the Committee are of the opinion that a thorough, intelligent, and persistent application of sanitary measures in the transportation of the sick, and in the external and internal arrangements of the hospitals, would render them more harmless to the neighboring communities. But to accomplish such results the whole system of management must be changed. The sick must be treated as centres of contagion, and from first to last, and whether in transit to the hospital, or on their return home, must be under proper sanitary care. The present hospitals for contagious diseases are not adapted to the present or prospective wants of the city. They are constructed like general hospitals, and without reference to the special diseases to be treated in them. In capacity they

were intended to accommodate only small-pox and typhus fever, and even for these diseases they are inadequate. No suitable provision has been made for scarlatina, measles, relapsing fever, etc., diseases which should be placed under as rigid supervision as small-pox or typhus.

In reviewing the preceding facts the Sanitary Committee conclude that "contagious diseases" should be placed more completely under the control and charge of the Board of Health. Many of them are absolutely preventable, and all are susceptible of mitigation or control by means which this Board with adequate power could command. The measures of prevention and control employed by the Board, viz., isolation of the sick at home or in hospital, according to the circumstances and surroundings of the person affected; the thorough cleaning and disinfection of rooms, clothing, etc.; the immediate destruction of the germs of disease which emanate from the sick, as far as practicable, have proved most satisfactory in their results when their application has *been unrestricted.* Indeed, we are of the opinion that could these measures of prevention be carried out in any community as rigidly as the necessities of the public health require, that community would never number among its diseases the plagues of modern times, viz., small-pox, scarlatina, measles, typhus, typhoid, and relapsing fevers, cholera, etc.

But unfortunately two sources of embarrassment attend the present application of these measures, and tend to render them seriously defective.

First—If the sick remain at home, the friends and physician in attendance too often consider the requirements of health officers as an unnecessary if not an impertinent interference, and submit to them to as limited a degree as possible. In the present state of popular ignorance of the laws which govern the origin and spread of contagious diseases, the true value of preventive measures is not appreciated, and this embarrassment of sanitary officers must be submitted to, and their work be but half accomplished.

Secondly—If the sick are sent to hospitals, this Board loses all control after it has delivered them at the receiving depot of the Commissioners of Public Charities, although it remains responsible for their care in the public estimation. This divided responsibility in the care of the sick is a most serious defect in the management of contagious diseases. While the Commissioners of Charities supply the needed

measure of medical relief, they cannot be expected to give that special sanitary care to these diseases which is necessary not only to the recovery of the sick, but to the prevention of the diffusion of the contagion. It is, on the contrary, the special study, and should be the duty of sanitary authorities, to employ most approved remedies for the care of the sick, and to apply the most approved measures for the destruction of the contagious poisons and to prevent their diffusion. In a word, the interests of the public health require that the class of poor, sick of contagious diseases, who are proper subjects for hospital treatment, should be under the care and control of the Board of Health from the onset of the disease to the recovery or death of the person.

But not only do true principles of sanitary government require this change in the management of contagious and infectious diseases, but it would appear that the Legislature designed to confer upon this Board some degree of responsibility.

Section 16, chapter 74, Laws of 1866, authorized the Metropolitan Board of Health to afford medical relief to and among the poor of said district, as in its opinion the protection of the public health may require, and may remove or cause to be removed to a proper place within said district, to be by them designated, any person sick with small-pox or other contagious diseases. This law was amended (Laws 1867, chap. 956, sec. 3) as follows:

"Said Board shall have the same powers in respect of persons afflicted with pestilential or infectious diseases, as are given by the sixteenth section of the seventy-fourth chapter of the laws of eighteen hundred and sixty-six, or otherwise, in respect of persons afflicted with contagious disease, and shall have power to provide and pay for the use of proper places to which to remove such persons, as well as to designate such places; and said Board may cause proper care and attendance for such persons so sick or removed, when it shall appear to said Board that any such person is so poor as to be unable to procure for himself such care and attendance."

This seems to be the only provision ever made by the Legislature for the care of persons sick of contagious and infectious diseases in New York. It is evident, therefore, that for the better protection of the public health, the Legislature by the amended Laws of 1867 expressly excepted from the Public Charities those sick of contagious diseases and transferred them to the Board of Health, with full powers, but without furnishing the means to provide places for their reception, and proper care and attendance upon the sick. Every day's experience in the

efforts of this Board to control the spread of contagious diseases confirms the wisdom of the Legislature in placing under its care and protection the sick of these diseases who are proper subjects for public charity. However stringent and effective the measures may be by which this Board seeks to quarantine and destroy the poisons of contagious diseases, they will be more or less unavailing, if those affected by them who enter hospitals are allowed, during any period of the disease, to pass from under its observation and control. In conclusion, the Sanitary Committee is of opinion that the methods of prevention against the spread of contagious diseases adopted by this Board are the most approved known, and if their application were unrestricted would prove in the highest degree effective. The circumstances which render their employment more or less ineffectual have been noticed in this report as being due to the limited care which the officers of the Board can exercise over the sick. It doubtless will not be found expedient to exercise any other than limited supervision of the sick who remain at home and have their own medical attendance and care. But the Board may with great propriety, and without opposition, assume exclusive charge of those who are so poor as to be unable to provide for themselves. It is through this homeless and destitute class that contagious diseases are especially propagated. To remedy this defect in the operations of this Board, we respectfully recommend the adoption of the following resolutions:

Resolved, That the interests of the public health require that this Board should have exclusive control and charge of all persons sick of contagious diseases, during the entire period of their sickness, who are so poor as to be unable to procure for themselves proper care and attendance.

Resolved, That for the purpose of making such control and charge complete and effective, it is necessary that the Board should provide adequate hospital accommodations, with all the necessary sanitary appliances, subject to the most approved sanitary regulations.

Resolved, That the "Special Committee on Legislation," together with the President and Counsel of the Board, be directed to inquire as to the powers of this Board to establish and maintain hospitals for contagious diseases, and be authorized to take such steps as they may deem necessary to carry into effect the preceding resolution.

Respectfully submitted.

G. CECCARINI, M.D.,
MAGNUS GROSS,
STEPHEN SMITH, M.D.

STABLE MANURE.

The Sanitary Committee, to whom has been referred the subject of manure-dumping, together with the reports presented to this Board by the City Sanitary Inspector on the condition of the various places where manure is dumped within the city limits, respectfully report:

That in view of the fact of a production of from 400,000 to 500,000 cart-loads of stable-manure annually, nothing can be more apparent than the necessity of affording all due facilities for the removal of this vast volume of offensive matter, for if such facilities were denied, the creation of numberless nuisances throughout the length and breadth of the city would be the consequence.

On no premises within the city limits the hoarding of manure for any length of time should be allowed, but its speedy removal from the same under all circumstances insured and enforced. The health and cleanliness of the city and the comfort of its citizens alike demand this. The question before your Committee is narrowing down, in consequence, as to the proper manner and method *of removing* manure. Some parties engaged in this business and applying for permits to this end, have all this time long protested that the removal of manure is rendered impracticable if the privilege is not granted them to deposit the manure in some place contiguous to the river, and keep it there till it is in a condition to be fit for agricultural purposes, or, to use the words of one of the inspectors reporting on the subject, "to have it remain on the dumping-ground for a time, to be determined by the demand for it, by the degree of fermentation it has undergone to make it valuable as an article of merchandise, and (as in the month of February last) by the state of the ice in the rivers."

Your Committee are of the opinion that they are not charged to treat the question of the removal of manure in this light, and that the probable loss or gain of those embarking in it, form no part of their legitimate consideration. The dumping of manure on the ground, and the turning over and decaying of unrotten material coming from the stables, having been made by numerous inhabitants the subject of frequent complaint and most earnest protest, the line of duty before your Committee, as well as the consequent action of this Board, can no longer be mistaken; it is simply and wholly to provide for the sure

and speedy removal of manure, irrespective of cost and inconvenience; it is to provide for the removal of manure in a manner and spirit as has been evinced in the provisions for the removal of night-soil, offal, dead animals, street dirt, and other refuse matter and incumbrances deleterious to health or incompatible with cleanliness and comfort. In this view of the case your Committee is further enforced by the established fact that some parties concerned in the removal of manure, and holding permits from this Board to that end, have done so without resorting to dumping on the ground, and that such removal of manure has taken place daily, notwithstanding the severity of the weather or the winter frosts.

In order to dispose of the subject in the sense above explained, your Committee recommend the adoption of the following resolutions:

Resolved, That the respective officers of this Board, and the Sanitary Company of the Police Department, are hereby enjoined and directed scrupulously to enforce all ordinances relating to and providing for the removal of manure from all premises, and from stables in particular, within the city limits.

Resolved, That from and after this date no application for dumping manure other than directly into a boat or vessel from the carts will be entertained by this Board.

Resolved, That all permits for dumping manure on the ground within the city limits are hereby revoked.

Resolved, That all parties having or holding manure-dumps, other than on bottom of boats or vessels, are hereby required and ordered to remove from the city all manure thereon before the first of May next.

Resolved, That the Sanitary Committee and the City Sanitary Inspector are hereby instructed to inquire into the necessities of the City as to the number and location of piers requisite for having moored thereat boats or vessels for the reception and removal of manure, and to report the same as soon as possible.

Resolved, That all applications for permits to dump manure directly from carts into boats or vessels must be made or renewed on or before the 15th of April next.

Respectfully submitted.

G. CECCARINI, M.D.,
MAGNUS GROSS,
STEPHEN SMITH, M.D.

ENGINEERING.

Health, held on the 20th day of Oc-
was adopted:

e and is hereby directed to prepare, in time
nature and necessity of a system of drain-
New York, and on sanitary engineering as
and they are hereby authorized to obtain such
may deem necessary.

ursuant to the above resolution, the
bert L. Viele to prepare a report upon
eport is herewith submitted.

ter, Charles H. Haswell was appointed
and was also requested by the Sanitary
rt on the same subject, which is herewith

ering; its Advantages and Necessity as
provements. By EGBERT L. VIELE.

cities—the centres of population and trade—
cient and modern world—reveal the same
e same uniform neglect of those salutary
the preservation of health and the prolon-
The spasmodic application of remedies, when
the population, has ever been followed by
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tary science were as well known to the Israel-
as they are to us; and sanitary engineering has
han the aqueducts and cloacæ of ancient Rome.
day lies beneath a pestilential pall, and death is
wafted over the undrained marshes that sur-
al capital of the Cæsars.

ses incidental to the successive stages of civiliza-
yond human control, have, in the instances of most
prevented the proper application of sanitary measures.

Their gradual growth from insignificant hamlets, with narrow and contracted thoroughfares, into densely populated towns, whose exterior limits were often contracted by walls and fortifications, which, unfortunately for the comfort and welfare of the human race, have been deemed a necessity, has been a great obstacle to sanitary improvements.

In the new cities of America few of these impediments present themselves, and the neglect of sanitary laws may, in most instances, be ascribed either to an imperfect knowledge of the subject, or to a neglect which only requires to be pointed out to insure a prompt application of the necessary remedies.

In the report which follows I have endeavored, at the risk of repeating some facts already known, to present the subject of sanitary engineering in such a manner as to convey to the minds even of the uninitiated the force of its leading principles and their practical application, not only to metropolitan improvements, but to the improvements of all cities and towns.

The subject is naturally separated into two divisions.

First.—General Sanitary Engineering, or that which relates to those works of construction which conduce to the health of the public at large, viz.: drainage, sewerage, water supply, paving, wharves, docks, etc., etc.

Second.—Special Sanitary Engineering, which embraces the internal arrangements of architectural erections with reference to light, heat, and ventilation; also the personal habits and conduct of life, and the proper disposition of refuse matter, etc., etc.

DRAINAGE.

It is a well established fact that the principal cause of fever is a humid, miasmatic state of the atmosphere, produced by the presence of an excess of moisture in the ground, from which poisonous exhalations constantly arise, and carrying into the system of those who inhale it a virus, which, if not sufficiently intense to produce fever, has such a disturbing effect upon the functions of some organs as to weaken the general system, and act as a powerful predisposing cause of some of the most common and fatal maladies to which the human body is subject.

It follows, as a matter of course, that the first effort to improve the salubrity of any place whatever, should be directed toward preventing the aggregations of water in particular localities, and to remove such as have been allowed to collect.

In order to illustrate more clearly this subject of drainage, let us examine it in connection with a district of country where the surface is in a perfectly natural condition, unaltered or unaffected by any artificial improvements, diversified by hills and valleys, the elevations and depressions forming the water-sheds and water-courses by which the ground is partially relieved of the excess of rain which falls upon it.

The evaporation which is constantly going on under the influence of solar heat upon the waters of the ocean and of the land, carries into the atmosphere large quantities of water, which through changes of temperature, becomes condensed, and descends again upon the earth. But a small portion of that which is annually discharged from the clouds is necessary to vegetation, or is absorbed by the ground. A portion of it passes off on the surface into the rivulets and rivers, and thence to the ocean.

Another portion descends through the soil by the force of gravity until it meets with an impermeable substratum; flowing along this stratum, it either accumulates in hollow basins, or diffuses itself through extensive tracts of subsoil, finding vent in the shape of springs; or by spreading itself over a large mass of soil, it saturates it as a sponge, rendering it unfit for cultivation, creating marshes and swamps, whence arise the malaria so destructive to health.

These are visible effects; but there is another condition by means of which this surplus water is rendered injurious to vegetation and to health. As soon as a portion of water is beneath the surface, it is acted upon by capillary attraction in addition to the force of gravity, the tendency of which is to hold it in suspension, whereby the soil becomes soured and chilled by the evaporation which carries the water off in the shape of mist, so that even in those sections of country where there is no evidence of marshes or swamps, the nature of the soil may be such as to render it extremely unhealthy.

As the sanitary condition of any city or district of country is so intimately connected with its proper drainage, and the latter is so dependent upon and governed by the topography of the locality, it would

appear requisite that any inquiry into the causes or remedies for sanitary evils existing in the city of New York should be based upon a thorough knowledge of the topography of the island upon which it is built; and I have no hesitation in expressing the opinion that one of the chief causes of mortality is to be found in the defective drainage of certain districts of the city; and furthermore, that this is an evil which is increasing as the city extends itself towards the northern portion of the island, and that the main elements by which the evil is increased are the so-called city improvements, or grading of streets and avenues which are now being carried forward.

Geologically the island of New York is a metamorphic rock or granitic gneiss, whose originally horizontal planes of lamination have been dis turbed and thrown up into an almost vertical position, with protruding veins of primitive granite. An extremely irregular surface has thus been formed, ranging in elevation from 0 to 150 feet above tide water, and interspersed with numerous valleys, through which originally flowed many drainage streams, some of them of large size, receiving their supply not only from the surface drainage but also from innumerable perpetual springs percolating through the planes of lamination. In most of these valleys are drift deposits, and there are many instances where sedimentary deposits of clay have formed basins impermeable to water, which has accumulated in permanent ponds.

This city like all the great cities of the world owes the selection of its site more to chance than design; and its rapid growth from a village to a populous city has been the result of circumstances unforeseen, and therefore unprovided for. The streets and avenues of the lower part of the city are the lanes and by-paths which formed the connection between the trading houses of the olden time. Neither they, nor the subsequent system of streets adopted for the upper portion of the city, have been laid out with any regard whatever to the topography of the island; but on the contrary, from their character, conflict at every step with the original formation; and from this conflict there has arisen an accumulation of evils calling imperatively for the application of remedies which are daily becoming more necessary, and which are daily becoming more difficult.

Without recurring to the fact which is constantly becoming more apparent, that in the densely occupied portions of the city, where there

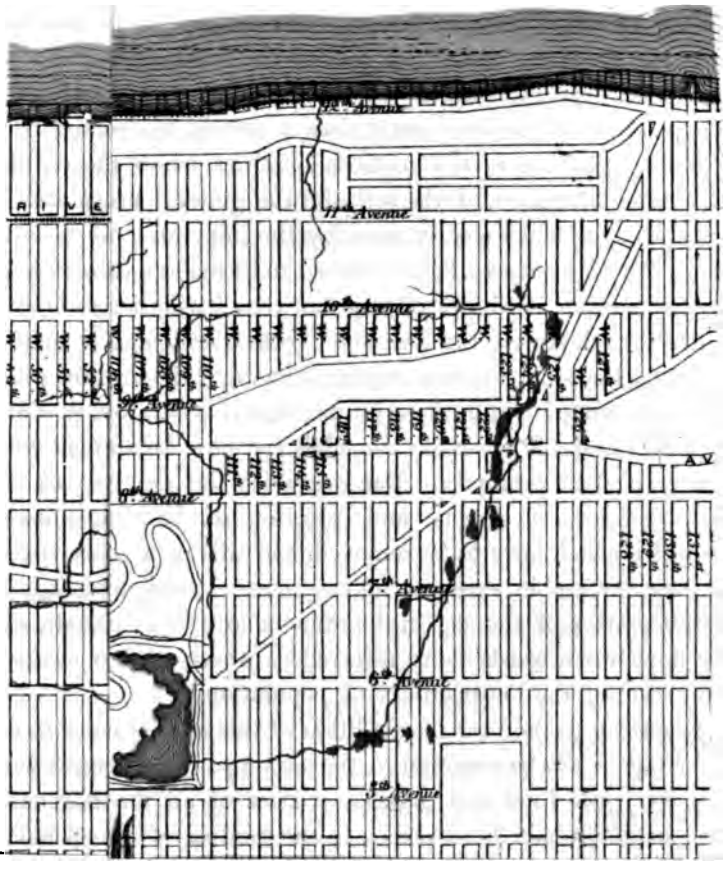
has been from the first a total neglect of the all-important matter of drainage, there are plague-spots and fever-nests which exist in the vicinity of old obstructed drainage streams, which no sanitary regulations can eradicate, and which require the most careful and unceasing vigilance to prevent the spread of epidemics, which an unfavorable condition of the atmosphere is always certain to create.

I have confined myself to those localities where the visible and indisputable saturation of the soil, and the general prevalence of consequent disease, make clearly manifest the imperative necessity of drainage. For this purpose I have caused to be made a careful examination of that portion of the city lying between Fiftieth and One Hundred and Thirtieth streets, the East and North rivers, and a map has been prepared to accompany this report, showing "the area of water saturation" embraced within those limits; and it is believed that an effectual application of the necessary remedies can now be applied without difficulty, if done promptly. But every day the progress of population, the extension of streets, and erection of buildings, increase the obstacles which have to be removed, and will in a short space of time be insurmountable, except at an enormous expense, and thus place that fairest portion of the city in the same condition as certain districts of the down-town wards above referred to, which are left to the exclusive habitation of the lower orders of population.

Referring to the present condition of this section more in detail, and referring in this connection to the accompanying map, it will be seen that along the lines and original courses of all the original drainage streams, there have been placed in the grading of streets and construction of dwellings numerous obstacles to the free flow of water through its original channels. The consequence is an accumulation in different localities of deposits of stagnant water, which in itself is not only detrimental to health and productive of epidemics, but by reason of accumulation it causes the saturation of an extensive area of ground, permanently unfitting it for building sites, since no house can be located within this area of saturation without being affected by dampness to a greater or less extent.

The result is that any change of temperature in the apartments of these houses must produce a condensation of the moisture which is ever present in these departments by virtue of capillary attraction,

1 50ft. to 130ft. Ins.



culvert. This acts as a dam at the inlet of the culvert, and sets the water back to a depth equal to the amount of stone thrown into the bed of the streams, and causes a permanent amount of water saturation.

Second.—The blocks and beds of streams are constantly being filled in with earth, sometimes with refuse garbage and other material, causing a permanent deposit of decomposing organic matter, which for all time remains to add a fetid character to the damp exhalations which arise.

Third.—Along the courses of these streams, numerous factories, slaughter-houses, breweries, shanties, and stables are located, discharging into them liquid refuse, overflow of privies, cesspools, etc. Even a public hygienic institution, like the Lunatic Asylum, located at One Hundred and Twentieth street, has not only imitated what might be regarded as ignorance in the inhabitants of shanties, but has rivalled them in a reckless disregard of every law of health, and every principle of sanitary science, exceeding in their culpable conduct the worst effects which a hundred shanties might produce.

This institution, which is situated on high ground between Tenth and Eleventh avenues, near the Hudson river, and with a rapid descent directly to the river, instead of taking advantage of its favorable location, and constructing a drain to the river, has made use of a stream originating near the institution as a receptacle for all its liquid refuse. This stream runs from One Hundred and Twentieth to One Hundred and Twenty-first street, and then follows the line of Tenth avenue to One Hundred and Twenty-fifth street, where it meets with low swampy ground, and empties into a pond at the junction of One Hundred and Twenty-fifth street and Tenth avenue. Thence it flows into another pond between One Hundred and Twenty-fourth and One Hundred and Twenty-fifth streets, and then, crossing Ninth avenue, it becomes a long stagnant deposit of water extending from One Hundred and Twenty-fourth to One Hundred and Twenty-second street, between Eighth and Ninth avenues. Along the entire extent of this dirty and disgusting deposit, the most sickening odors are perceptible, and fevers are constantly prevalent, the inhabitants complaining most bitterly of the scourge they are constantly exposed to.

As before stated, a simple conduit to the river would have saved all this.

The brewery at Ninth avenue and One Hundred and Seventh street is a similar instance, in which a large area of ground is saturated with liquid refuse, emitting the most offensive odors.

From these two causes alone, the whole section of the city from One Hundred and Seventh street to One Hundred and Twenty-fifth street, and from Seventh to Tenth avenues, is really unfit for residences at this time, and any one attempting to reside there would be exposed to malarious disease.

These are two instances out of many which exhibit the condition of things in that portion of the city embraced within the limits laid down on the accompanying map. The same general result obtains in all cases.

The remedy to be applied should be searching and comprehensive, and should be applied in this way. The beds of all these streams should be excavated and cleaned out to a firm bottom, and a careful examination made as to the precise locality of all springs by which they are fed. Then there should be constructed along their entire course a well-built dry stone drain, with flat stone covering, allowing the water to percolate freely into it. These drains should be continued so long as springs exist until a sewer is found which is low enough to receive their contents. If a sewer is not found low enough, or will not be constructed on the completion of the sewer system on the line of the stream before it reaches the river, then the stream should be headed off at a point sufficiently high to admit of its being turned from that point into the sewer.

This is the simplest and the only method to be applied in all cases, and the sooner it is done the better; delay is fatal.

As an example of the manner in which a drainage stream may be made a permanent source of disease, I will cite the instance of one which rises near Fourth avenue, between Ninetieth and Ninety-first streets. In its course it runs under a row of houses on Ninety-first street, where it is converted into a receptacle of sewage; the consequence is that in all these houses typhus fever prevails, and the lower portions cannot be occupied at all. Nearly all of them have been vacated. Near Lexington avenue, this stream crosses Ninety-first street,

and is a covered drain through a vacant block, and under Third avenue receiving the contents of drains emptying into it from the rear of houses on Ninety-second street; crossing Third avenue, it runs under a brewery, and afterwards becomes an open filthy drain in the rear of buildings facing Ninety-second street; crossing under Ninety-second street, it has made an exceedingly offensive and malarious deposit at Second avenue, Ninety-second and Ninety-third streets. At this point an obstructed culvert prevents it following its natural course to the river.

No possible method could be adopted to make this natural stream a more prolific source of disease, and no better illustration could be found of the consequence arising from a neglect to provide properly for this want of drainage in the outset. Nothing but a thorough and general system of drainage will save a large portion of the city from permanent and irremediable injury.

The number of individual instances which have been brought to my notice where disease and death have been traced directly to imperfect drainage and neglected water-courses, is very large. In one instance an entire family, including the servants, residing in a very expensively built house on Fifth avenue died of diphtheria. The house was located over an old water-course.

A well-known citizen, of large wealth, told me his only daughter had died of a disease contracted from malaria in his house, which he discovered was over a neglected water-course.

Many persons have told me that their families were always sickly until, having ascertained that their houses were damp from this same cause, they removed from the locality.

Facts of this nature are almost daily brought to my notice.

SEWERAGE.

There is a wide difference between sewerage and drainage, although it is very generally supposed that when a city is provided with a complete system of sewers that thorough drainage is also accomplished. Sewers are necessarily water-tight, and consequently cannot receive drainage water from the soil through which they pass. Whereas drains are built either of dry stone, masonry, or some porous material admit-

ting the water to percolate into them sewers merely afford a channel for the free flow of the water to some point of discharge.

Nothing in the administration of civic affairs is of more importance to the welfare of a city, or the health and comfort of its population, than that of effective sewerage; and there is no duty devolving upon those who are charged with the conduct of public affairs in any community, which carries with it a greater measure of responsibility than that of providing a proper system of removing surplus water and refuse matter from the limits of the city. And yet there is no subject which, as a matter of legislation, is approached through more obstacles.

There seems to exist in the minds of many a prejudice against legislating for the future, little thinking that in this vital matter, to leave to the future a legacy of neglect is to leave also a legacy of woe.

The vast sums which have been and are still being expended in the older cities of the world, show the alarming condition to which, through years of neglect, thay had at length arrived. Even in this country, with all the experience of the past to guide us, we find that the unsystematic manner in which the sewerage of our large cities has been conducted, has already resulted in serious evils.

An official report with reference to the sewerage of the city of New York, says: "There are already more than two hundred miles of sewers under our streets, nearly all of which have been built without any regard to system.

"To correct or even lessen the evils resulting from so many years of mismanagement is a task requiring much study, care, and time."

It should be the study, in the preparation of plans for sewerage, to make them as complete and comprehensive as the nature of the circumstances require, so that the unity of the system will not be marred by being extended.

In the arrangement of a plan, the principal points to be considered are:

First.—The topography or original configuration of the surface of the ground, the natural water-courses and valleys of drainage.

Second.—The artificial changes that have taken place by the laying out and grading of streets and avenues, impeding or expediting the flow of water.

Third.—The rain-fall or amount of water discharged from the clouds during the year upon the area to be drained.

Fourth.—The water supply or distribution of water to the inhabitants from the reservoir and water-works.

Fifth.—The accumulation of water in deposits from springs or other sources than those mentioned.

The rectangular plan on which the city of New York is laid out above Fourteenth street, necessarily enforces a rectilineal system of sewerage, and the established grades of the streets determine the area of drainage, so that by a simple calculation of the elements entering into the systems, the size, shape, direction, depth, and inclination are readily determined.

Yet it is not until a very recent period, with all these advantages, that a harmonious and systematic plan has been carried out. In the older portions of this city, and in many other cities, the laying out of the streets, and the grades established for them, offer many obstacles to perfecting a plan of sewerage. Here are exhibited the evils resulting from a want of system from which many large cities are destined to suffer.

The course pursued of establishing the position and grade of streets in accordance with immediate and local convenience and necessity, leads in the end to much confusion, irregularity, and expense.

When the owner of a tract of land within city limits is suffered to lay it out in such a manner as suits his own purposes or caprice, without any reference to the manner in which any other tract or portion of the city is laid out, there necessarily follows an incongruity, which becomes every year more and more apparent and inconvenient, until, under the influence of pressing public necessity, grades are altered, streets are extended, opened or widened, in most instances at a great expense, and seldom fully accomplishing the object aimed at. All this is avoided, and the interests of property owners greatly enhanced, by determining upon a general plan of streets and avenues which embraces the entire area of the city. It is important that the avenues of communication should be clearly defined and laid out in accordance with a harmonious general plan.

The streets and avenues of a city are the veins and arteries through which the current of its vitality flows, and if that current is checked or impeded, the prosperity of the city suffers. Unless a comprehensive [illegible] in advance of private improvements, it becomes a

matter of great difficulty and sometimes an impossibility to correct the evils that may arise.

Defective sewerage is one of the most prolific sources of disease. An imperfect system is worse than no system at all, since an accumulation of evils is thereby created.

Among the defects which are not unfrequently found to exist are—a want of a general system; errors in size, shape, and inclination; use of improper materials; errors as to depth and outfall; faulty connections; improperly constructed silt basins, and a want of proper ventilation.

All of these defects have been found to exist in the sewer system of this city.

In Canal street, for instance, the sewer is built in the bed of an old tidal water-course. The bottom of this sewer is an inverted arch. It was found that it had fallen out for a considerable distance, and for a long period of time the sewage was discharged into the oozing subsoil, permeating with its poison that large area of water saturation. It will some day become imperatively necessary to raise the whole of that depressed area as a measure of public health.

Experience has shown that sewage acts chemically upon the mortar joints of brick sewers, so that the sewage permeates. And it has also been found that the mortar of stone and brick receiving-basins were acted upon in the same manner, and that in many instances the water which was depended upon to form an obstacle to the escape of sewage gases had leaked away, leaving the basin perfectly dry, so that the most offensive and sickening odors came from these basins.

Under the present management of the skilful and energetic Engineer of Sewers, the whole system is undergoing many improvements. Yet the system will never be complete, nor will it fulfil the object sought to be attained until a "low level sewer" is constructed along the exterior line of the city. The future health and prosperity of New York require this construction.

It is assumed that to defective drainage and sewerage may be attributed most of the sanitary evils from which the city of New York suffers. We find that of the 12,000 acres comprising the superficial area of the city, representing 150,000 building lots, one-fifth of that amount, or 30,000 building lots, is, by reason of the presence in greater or less

quantities of water in the soil, rendered almost unfit to be occupied as sites for dwellings or for commercial purposes. Yet no attempt has ever been made to establish a system of drainage, by which these 30,000 lots, averaging in value $10,000, or possessing a total value of $300,000,000, can be made suitable places for residences or warehouses.

The sewerage system, imperfect in itself, has no effect whatever upon the drainage. There are many localities where coffer-dams and pumps are absolutely necessary to enable the builders to secure proper foundations for the structures about to be erected.

In a previous report upon the topography and hydrography of New York, the particular localities were pointed out where the accumulation of moisture in the soil from springs and other sources is productive of injurious effects. Upon the map accompanying that report, the various lines of sewers, together with the elevations indicating the established grades of the streets, are represented, showing that from the anticlinal axis of the island the sewerage descends to the North and East rivers, being conveyed directly into those rivers, polluting the waters, tainting the air, creating deposits of solid matter at the wharves and piers, and is in every way a fruitful source of the very evils which their construction was intended to remedy, not the least of which is the foul air, which at low tide and in certain directions of the wind is forced into the dwellings, and more especially felt in the chambers of the sick.

The remedy for all this would be found in the construction of the "low level sewer," which would receive the contents of the lateral sewers, carrying them to points where they could be discharged at ebb tide, or transferred to properly constructed vessels, and transported as valuable fertilizing materials to lands now lying waste in close proximity to the city.

Thus one great and positive good would be accomplished, the benefit of which to the commercial interest alone would be immense, while as a sanitary measure, and more particularly as a means of thorough drainage, the results will be incalculable.

These sewers lying below the lowest substratum of water deposits would effectually remove all traces of moisture from those sections which have been for so many years the pestilential spots of the city.

If the method of construction adopted should be that of coffer dams

outside of the bulkhead lines, the coffer dams, by being made permanent in their character, would serve to intercept completely the tidal water which now permeates the made land along both rivers, and thus secure the great desideratum of dry and deep cellars for the water-front warehouses.

The outer lines of the exterior streets being formed by this construction, the additional width so much required for these streets would be secured.

It is not too much to say that the successful construction of these works will add one third in value to the property directly benefited by thorough drainage, amounting, at a low estimate, to the sum of $100,000,000, to say nothing of the indirect results obtained in the general sanitary improvements arising therefrom.

In presenting this plan, no claim is made to originality, since it is a fact accomplished in the city of London. For a long period of time, and even after the radical defects of London sewerage were removed by the organization of a board of public works, the polluted water of the Thames, into which the sewerage system debouched, sent the most sickening odors over the metropolis, constantly threatening the return of the much-dreaded plague, and rendering a residence in that city a most undesirable fate. Yet this disgusting and alarming condition of things, which was endured so long, might have been still further prolonged had it not been for the fact that the Houses of Parliament were located on the Thames, and the purification of its waters thus became a necessity to the legislation of the British Empire.

Strong as was that necessity, ours is still stronger, since we have a twofold object to be obtained, and although through a want of public spirit or temporizing policy, the construction of these works may be delayed, there can be no question that it is the only remedy for a great evil which has been borne already too long.

The shape and size of the sewers are determined by the amount of sewerage which they are required to convey. Cylinders of vitrified pipe are found to be the best in all cases where the sewerage is permanently limited in quantity, since they are kept from obstruction with the least amount of water. But in the main sewers and principal branches egg-shaped sewers of brick are the best. The lower segment should be coated with asphalt to prevent the action of the sewerage acids on the

cement or mortar. The Engineer of Sewers is substituting for the present receiving-basins of masonry an iron cylinder which will obviate the defects in the former, and prevent the escape of the sewer gases. A drawing of this receiver is annexed.

The proper ventilation of sewers can be secured by connecting them with the pipes or conductors that convey the water from the roofs of the houses, so that the gases shall be discharged into the upper currents of air, and thus be more readily carried off and distributed.

WATER SUPPLY.

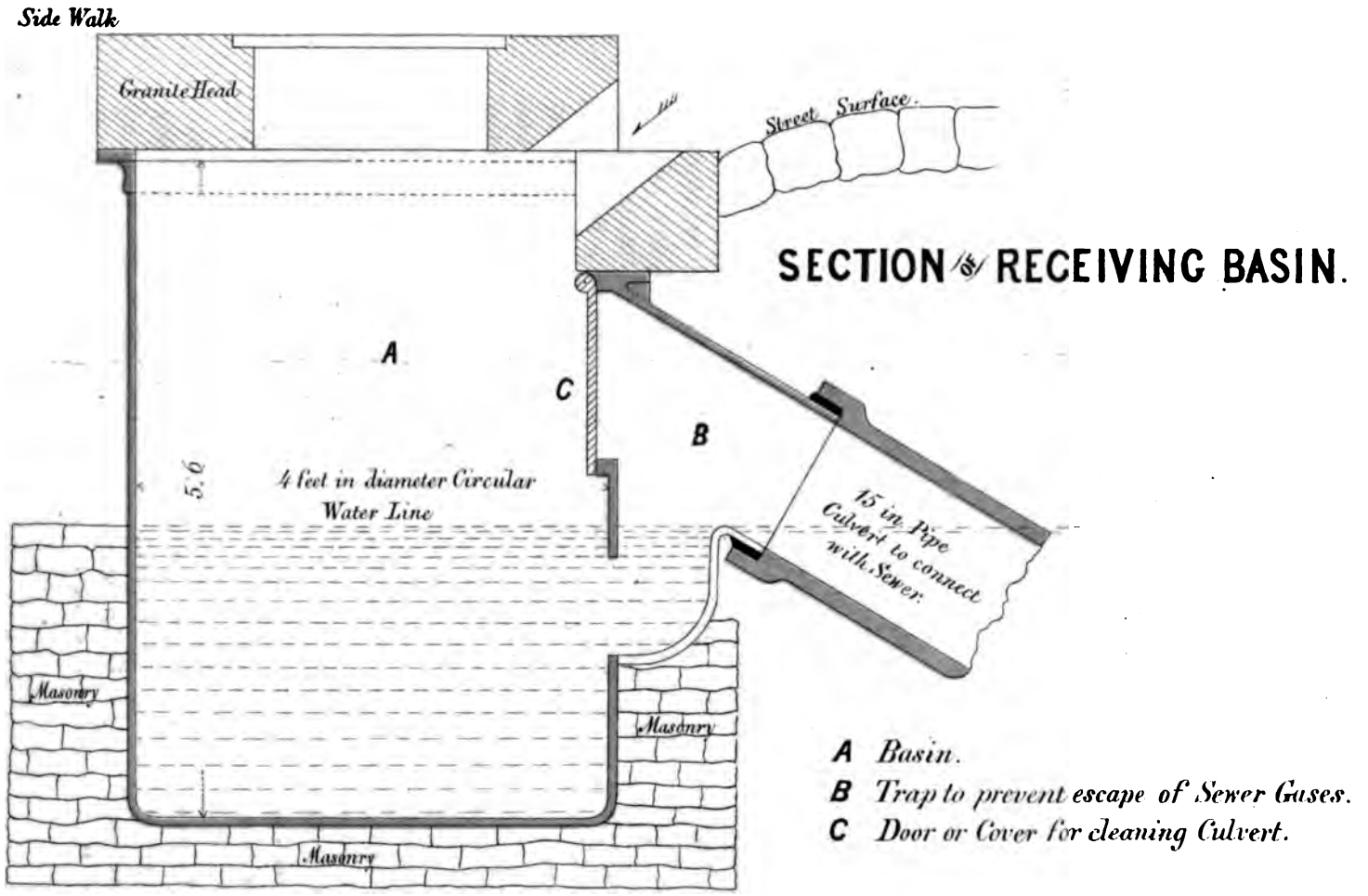
Without an adequate supply of water no city can be clean or healthy, to say nothing whatever of comfort.

Water alone can remove the thousand impurities which are inseparably connected with a large population. Of course no system of sewerage would be complete without it, since the sewer, being merely a passage for sewerage, it can only be so when a sufficient supply of water is maintained. The past year was remarkable for a long continued drought extending over a large area of the Atlantic States. Serious alarm was felt in many of the large cities in regard to the diminished supply of water. Boston, Philadelphia, and Brooklyn suffered more than New York, as by the prompt action of the Department of Public Works several lakes in the county of Putnam were at once tapped and the water conveyed to the storage reservoir. Without this action the most disastrous consequences might have resulted to this city.

The use of such a large amount of water impregnated with many vegetable impurities suggests the question whether a careful sanitary survey of the sources of the Croton should not be made. The original springs came from primitive rock, and are therefore pure in themselves; but the various streams which carry the contents of the water-shed to the basins must pass through much that is impure, and those impurities should be ascertained and provided against.

While securing an adequate supply, its purity should also be secured. Entering so largely into the human organism, water must inevitably carry its impurities into the system, hence the greatest care should be exercised in regard to the purity of a public supply.

Much of the sickness which prevails in malarious districts, may be,



SECTION & RECEIVING BASIN.

A *Basin.*
B *Trap to prevent escape of Sewer Gases.*
C *Door or Cover for cleaning Culvert.*

attributed to the impurity of the water which, through infiltration, becomes tainted with vegetable decomposition. Hence too much care cannot be exercised in a careful examination and supervision of the sources from which the water is obtained.

In connection with the subject of water supply there is the question of public baths.

That no human being can remain healthy without frequent ablutions is as certain as that he cannot exist without food; but further than this, an unclean person is a source of contagion. The excremental action through the pores of the skin covers the body with filth, which, if not removed, becomes a source of disease and contagion. Therefore it is that the entire population is deeply interested in providing, for those who are deprived of the usual facilities, for bathing in public baths, where at all seasons of the year men and women can go and make themselves clean.

There are a number of unused market-houses situated in the very localities where the class of people live who are most in need of bathing facilities. These buildings could be fitted up at a comparatively small expense, where for a nominal sum of ten or fifteen cents persons could go and bathe, especially in the winter season.

When we reflect how great a moral influence would be exercised upon the less fortunate class of men by inculcating and stimulating the habits of personal cleanliness and providing the means for it—how much vice and crime would thereby be obviated; how much less liable the entire community would be to contagious disease; how much the general tone of society would be elevated thereby—we require no further arguments in favor of immediately supplying this great public necessity.

Another use of water, which would add greatly to the health of the city, is that of washing the streets after they have been swept, so as to remove entirely the dirt that accumulates on the pavement. For this purpose a supply of water could be obtained from the river by a simple mechanical arrangement. This water, holding in solution a large proportion of salt or chloride of sodium, itself a disinfectant, would serve the purpose of flooding the sewers, especially during a long period of drought, and would thus remove a prolific source of disease from the city.

If the 277 miles of sewers, as they actually exist, could be uncovered in their entire extent and exposed to the sight, we should tremble for the health of any one who lived in a city with such arteries of filth and corruption ramifying every avenue of communication.

The time may arrive only too soon when an arrangement of this kind may be imperatively necessary.

There is no question as to an ample supply of water for all the purposes of comfort, cleanliness, and health in this city.

When the storage reservoirs now under construction are completed, there will be a storage supply of nearly 5,000,000,000 gallons; the daily distribution capacity is 60,000,000 gallons.

London has a daily supply of 98,000,000 gallons.

STREET PAVEMENTS.

There is perhaps no one subject connected with the growth and improvement of cities which has had so marked an effect upon the health of the inhabitants as that of paving the streets. Although next in importance to the removal of surplus water from the soil, as a general rule it is not thought of, unless the nature of the soil or the constant traffic compels a resort to it in order to facilitate business. It has seldom been resorted to simply as a sanitary measure, yet the history of a large number of cities shows conclusively that a great decrease in mortality is due alone to the paving of certain streets in localities previously noted for their unhealthiness. This is owing to the fact that less water gets into the soil, and the latter being covered by the pavement, is not acted upon by the direct rays of the sun, thus preventing the generation of deleterious gases and miasma. Dr. Bell cites the city of Philadelphia as an instance of the great benefits derived from pavements, and states that the exemption of the inhabitants from intermittent and bilious remittent fever has, with great uniformity, followed the paving of the streets.

The space now called Dock street was, in the early history of Philadelphia, a miry swamp traversed by a sluggish stream, on either side of which periodical fevers of all grades prevailed with a violence equal to those met with in the most sickly districts of the West. The exposed surface having been paved and the creek partly filled and covered over,

and made the line of a large drain, no person residing there now has any apprehension of fevers such as those that affected the former dwellings there. A like change from the operation of a similar cause has been wrought in the districts of Southwark, Kensington, and Richmond. The change in the sanitary condition of Southwark is the more obviously due to paving and subsequent attention to scavengering, as the greater part of the drainage is on the surface, owing to the limited extent of sewers.

Louisville, Kentucky, is mentioned by the same writer as furnishing one of the most remarkable examples of the beneficial change produced in the health of a city by paving. This city—once called "the graveyard of the West"—is now as healthy as any town in that extensive region. Intermittent fever was a regular annual visitor, and occasionally a form of bilious fever prevailed, rivalling yellow fever in malignity, and threatening to depopulate the town. After the fever of 1822, the citizens seem to have become awakened to a sense of their condition, and as a means of avoiding the evils from which they suffered, a system of improvements was introduced, the principal feature of which was the paving of the streets. An entire change in the sanitary condition of the city followed immediately.

It seems unnecessary to multiply instances—the facts are the same everywhere. No city can be healthy unless the streets are paved, and they should be well paved in the beginning. An inferior pavement is almost worse than none at all, as it is constantly out of repair, and fails in its purpose as a sanitary measure; and when we take into consideration all the inconvenience and evils attendant upon a bad pavement—the frequent repairs required, the additional wear of carriages, the greater amount of traction and consequent loss of power, and the injury to horses—it will be found that a cheap pavement is always the most expensive in the end. Besides, the cleanliness of a city—its scavengering—depends so much upon its pavements; for whatever may be the character of the soil, it is impossible to keep the streets cleaned unless they are well paved. The refuse matter which collects upon the surface, and which it is impossible to remove except from a pavement, becomes incorporated with the soil, and supplies a constant and fruitful source of disease; and in a bad pavement, the holes that are constantly being formed are the receptacles for offensive materials. Even a hard

rain, instead of contributing to cleanliness, has a contrary effect, by fermenting those substances, which, in a dry state, would in some measure continue inactive, and in a great degree harmless.

Assuming it, therefore, to be admitted that the pavement of the streets is a matter of the first necessity, an important question arises at once as to the character of the pavement: What materials are the best? and how should it be constructed?

The conditions of a perfect pavement are, a light grade, easy traction, and a good footing for horses. It should be so constructed that water could not percolate through or under it, so that it would not be liable to get out of repair, and so that any portion could be readily taken up and replaced without impairing its stability.

The only pavement fulfilling all these conditions, combined with durability in the material, is the concrete pavement, or small cubical blocks of primitive rock laid upon a bed of concrete. Innumerable experiments and ingenious inventions have been tried, in almost every city of the world, to determine upon a pavement fulfilling all the necessary conditions, but nothing has been found to excel or equal the old Roman pavements, which have survived the lapse of time and destruction of everything contemporary with them, and bid fair to survive the very memory of those who constructed them.

The principles on which the Roman pavements were constructed are those which are requisite to a good pavement. Whenever a pavement is so constructed as to admit of water percolating through into the road bed, there the frost will follow, and the pavement will be upheaved.

Cobble-stone pavement is a mere temporary expedient.

Wooden pavements have recently come in vogue in this and other large cities, and a great many different modes of using wood have been invented and applied. Among them there are many absolute failures; and this has thrown discredit upon the use of wood, which is not, however, fully warranted.

There are many advantages in a wood pavement, provided it is properly laid upon a suitable foundation. In fact it is in the matter of foundation that the principal difficulty has been found to exist in this kind of pavement.

Some years ago wooden pavements were in such favor in London that most of the great thoroughfares were so paved. A large number

of patents were taken out for new forms of blocks, and machinery for preparing them, and also for combining them and laying them down.

Contracts were also entered into for terms of years, so that long after wooden pavements had fallen into disfavor they continued to be used.

When these roads were new, and in good condition, they were easy to the horses, pleasant to the travellers, and especially so to the inhabitants of crowded thoroughfares from the cessation of noise. The failures thus far, both in England and this country, in wooden pavements, have been chiefly owing to a want of suitable foundation. The value or durability of a pavement depends mainly on the foundation, and in the repaving of streets either with stone or wood, where cobble-stone pavement has been already laid, it would certainly not add materially to the expense, and very much to the stability of the pavement, if the cobble-stone were used for the foundation, by paving them at a sufficient depth from the surface, to allow a sufficient quantity of sand to be used for the new pavement.

It is very certain that a street paved in this manner would not need repaving very soon again; and the frequent depressions which now exist in almost every stone pavement in the city would be provided against, and thus one cause of disease from deposits of water in pools will be obviated.

VENTILATION.

Vitiated air, whether it be the result of animal or vegetable decomposition, or produced by respiration, has always been the most prolific source of disease.

So dependent are the functions of life on the purity of the air we breathe, that it is utterly impossible for a human being to inhale impure air, under any circumstances, without a loss of physical health proportionate to the degree of contamination existing. And it is in a great measure owing to the ignorance existing upon this subject that so few persons can ever be said to feel perfectly well. Not only are the bodily functions disturbed by impure air, but the mind feels its direct influence, especially in crowded assemblages, causing stupor, headache, nausea, to say nothing of its after effects.

Yet no subject is less understood, or has received in architectural

constructions, public and private, less attention than ventilation, while it should be in reality the first to be considered.

Every building erected for the use or occupancy of human beings, no matter for what purpose, should be provided with an adequate system of artificial ventilation. In nature's grand and harmonious organization, countless and ever-varying currents of air serve to dilute and neutralize the deleterious gases, which the incessant decomposition of organic matter causes to be evolved, and thus preserves the surface of the earth for animal existence. But in a confined dwelling these life-saving currents are shut out, and the ever-active power of air, deprived of the necessary circulation, develops the most subtle and destructive poisons. If it were possible for the tainted human breath to be tinted with some coloring matter, as it is exhaled from the lungs, and become darker in proportion to its increased unfitness for inhalation, we should, in a crowded and ill-ventilated assemblage, find ourselves enveloped in a dense cloud, whose visible appearance would cause us to fly from a danger so clearly apparent.

How essential, therefore, that, by a clear understanding of this subject, our reason, in the absence of visible testimony, should direct action in a matter so important to human health.

More particularly in large cities, where, in educational institutions, hospitals, churches, places of amusement, and places of instruction, there are always gathered together large masses of human beings, every one of whom, at each respiration, contaminates a cubic foot of air, which must be replaced by pure air, or reinhaled to poison the blood and convey disease to the system, should the true principles of ventilation be universally understood and practised, not alone in public edifices, but in private dwellings, more especially in those which are occupied as tenement houses. It would be safe to assert that in all this great city, with its million inhabitants, there are not one hundred buildings, either public or private, that can be said to be well ventilated, and, therefore, nearly every inhabitant is at this moment inhaling impure air. The effect of this upon the blood, which fails to find in its passage through the lungs the air essential to its purification, is seen in the physical degeneration of men which takes place in all crowded cities, causing a diminution of stature from generation to generation, and a general depreciation of both the physical and moral

attributes. The pallid face, the hectic cough, the lassitude of body and loss of energy, are all the accompaniments of impure air; and vice and crime, so often associated with poverty and want, seem also inseparable from vitiated atmosphere.

The remedy for all this should be as universal in its application as the evil is wide-spread in its effects.

Ventilation means not only the removal of bad air, but the supply of pure air.

An edifice or room in which large numbers of people assemble can not receive an adequate air-supply without the use of mechanical force; and no building, either large or small, can be properly ventilated unless there are established in every room two positive currents of ingoing and outgoing air.

In summer it is not a difficult matter to secure ventilation by means of windows or other openings connecting directly with the outer air. It is therefore in the ventilation of rooms in winter that we must resort to an artificial method, and this is most easily accomplished in connection with the heating apparatus. All plans for heating buildings, either public or private, should be by the introduction of pure air taken from an elevated stratum of the atmosphere, and so heated as shall not deprive it of its oxygen. Any other plan is deleterious to health.

The introduction into apartments of iron coils containing steam or hot water, by means of which the foul air in the room is heated, and then inhaled, is wrong in principle.

The introduction of air taken from the area or surface of the ground, and then heated by being conveyed through a brick or iron chamber in which is a red hot iron cylinder, very generally done even in the most costly houses, is also wrong in principle.

Whenever a building is of sufficient extent to warrant the use of a steam engine, the heating and ventilating apparatus can be advantageously combined. A shaft extending to the top of the building supplies the pure air. A fan driven by steam draws the air into a chamber, before entering which it is purified by revolving jets of water; from this it is forced through a coil contained in a steam chest, by means of which it is heated, and from thence distributed over the building, entering in all cases near the ceiling, while a return current of foul air is drawn off near the floor, and sent outside of the building. In

this way hospitals, churches, theatres, public institutions, and hotels can be thoroughly heated and thoroughly ventilated.

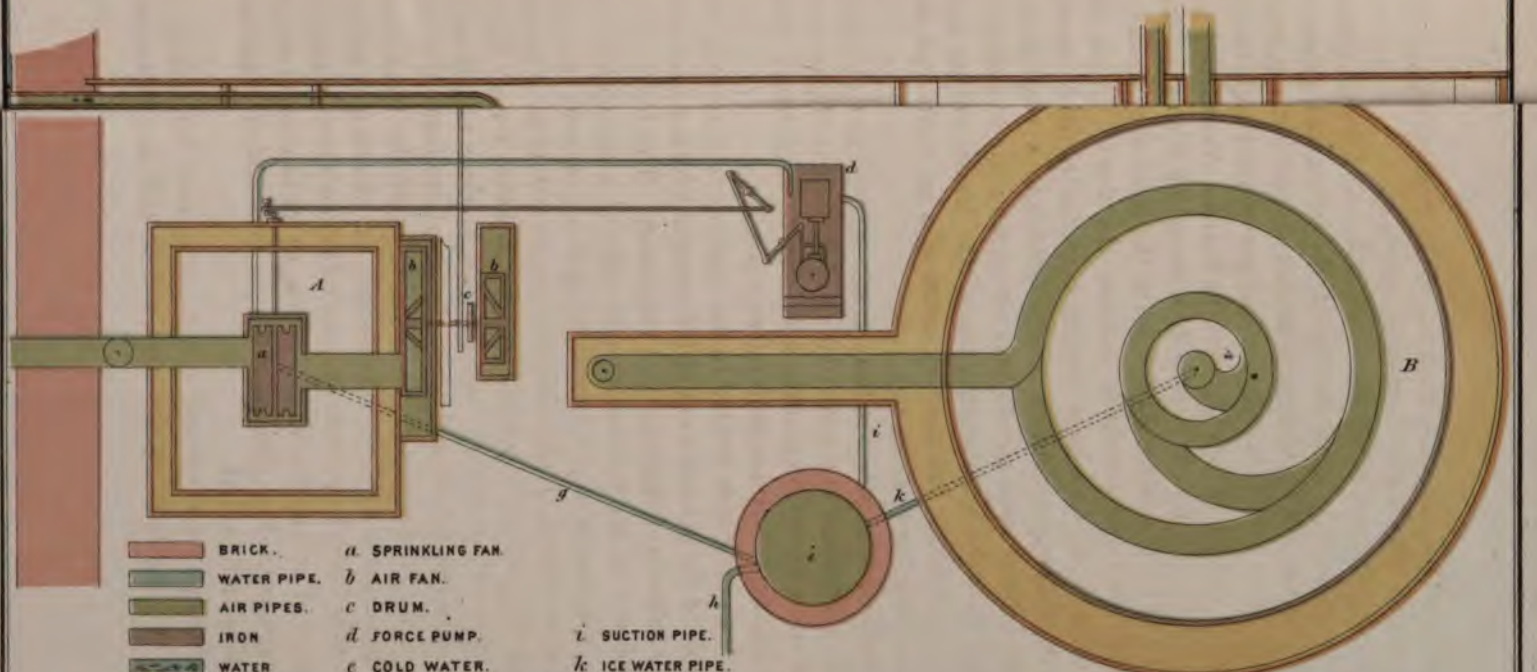
In dwelling houses, where the common hot air furnaces are used, the air should be brought from the top of the house, and passed over an evaporating pan, without coming in contact with red hot iron, and the furnaces should be so constructed that coal gas cannot escape into the heating flues, as this gas is very injurious to health. Ventilating flues adjoining the chimney, so as to secure an ascending current of warm air, should be in every room. At the top of the house they should be provided with revolving turrets to increase the draft. In all tenement houses there should be a large ventilator connected with the skylight, so that the stairway could thus be converted into a ventilating shaft; and every interior room should have an opening into a ventilating shaft extending from the bottom to the top of the house, and an ascending current established in this shaft by means of a gas burner at the base, and a revolving turret at the top.

The ventilation of street railway cars is referred to under that head, and no less important is the ventilation of the cabins of steamboats, the offensive odors of which are often sickening in the extreme. The same method will apply to them as in railway cars.

There is an institution located in the upper part of the city which is an example of the general want of information which exists on the two important subjects of drainage and ventilation. The buildings of this institution have all the appearance externally of a correct architectural structure, spacious in extent, commanding in appearance, occupying an elevated site overlooking the Hudson; the grounds sloping towards the river, and fringed with a natural growth of forest trees. Conducted by gentlemen of intelligence and cultivation, whose philanthropy and zeal cannot be questioned, and under the superintendence of a board of directors, among the names of whom are those of the most estimable and worthy citizens of New York—men of wealth and refinement. Yet the entire institution, from attic to cellar, and the grounds in the whole extent of twenty-five or more acres, so far as regards ventilation and drainage, exhibit an absence of proper information remarkable in an institution of this kind.

The buildings are large and commodious, and the ceilings high. The main building faces to the west, and to this are connected two

ELEVATION OF VENTILATING AND HEATING APPARATUS.



BRICK.	*a.* SPRINKLING FAN.		
WATER PIPE.	*b* AIR FAN.		
AIR PIPES.	*c* DRUM.		
IRON	*d.* FORCE PUMP.	*i.*	SUCTION PIPE.
WATER	*e* COLD WATER.	*k*	ICE WATER PIPE.
SAWDUST	*f* FEEDPIPE TO SPRINKLER.	A	PURIFYING APPARATUS.
WOOD	*g* WASTE PIPE.	B	COOLING OR HEATING APPARATUS.
ICE	*h.* OVERFLOW PIPE.	C	FOUL AIR DISCHARGE.

wings, in the north and south respectively. There is also a large building in the rear of the centre of the main building, and still another large building further in the rear parallel to the main building, and connected with it by galleries. There are thus formed several interior courts, which are unprovided with proper drainage, and consequently must always be damp.

There is no general system of ventilation provided, and every room is deficient in this particular.

The entire sewage of the institution has been suffered to flow in an open channel in a ravine and to empty itself into a slough, of about an acre in extent, at the foot of the ravine, which, although occasionally overflowed by the tide, is every day exposed to the direct action of the rays of the sun, and a black fœtid mass of decomposing matter generates incessantly malarious gases, which has had the effect to prostrate a large number of the inmates with typhus fever. It is believed that no more effectual method could possibly be conceived of to produce this result, and it is hoped that the publicity given to this matter will have the effect to cause the managers of similar institutions to examine more closely these important subjects and supply the omissions which they also may be suffering from.

STREET CLEANING.

The constant sweeping of the streets is so essentially necessary to the preservation of health that it seems scarcely worth while to refer to it. Yet it is supposed by some that, unless the accumulation of mud or dirt becomes so great as to be offensive, scavengering is a useless expense; and it is probable that if it were put to vote in some cities, whether the streets should be swept twice instead of three times a week, the latter increasing materially the expense, it would be decided in favor of sweeping but twice. It is not, however, generally known that there is sometimes more danger to the health of a city from removing an accumulation of refuse matter than to leave it alone. For this reason frequent scavengering becomes a necessity. If the refuse has once been suffered to accumulate, it should not be removed in hot weather. An attempt to clean the streets of Vera Cruz, after they had been neglected for some time, almost involved the destruction of that portion of our army stationed there during the war with Mexico.

The material obtained from the streets has, in many instances, been used for filling sunken lots and redeeming low ground. No greater folly could possibly be exhibited, for such a course has never failed to be followed by the most aggravated fevers; besides, the material properly belongs to agriculture, so that in an economical view it is wrong so to dispose of it. The proper course to pursue is to secure a piece of waste ground outside of the limits of the city as a place of deposit for this material. This could be the more readily done in New York from the convenience afforded by the city railways. Transporting it in boats does not pay for the labor required. Whereas, with cars, the dirt can be dumped into them from a platform, and again dumped from the cars at the place of deposit. By a proper arrangement of pits, night-soil and even offal might be added to this deposit; and, in time, a most valuable accumulation of the richest kind of fertilizing material would yield a revenue to the city.

All of the streets should be swept at least three times a week, and the thoroughfares every night. The manner in which it is done in Paris exhibits the advantages derived from a thorough system.

The general supervision of this branch of municipal administration is confided to the mayors, while its special supervision falls under the prefect of police. The sweeping of the streets is done at the charge of the proprietors, or where there are shops, no matter of what kind, at the expense of the owners of these shops; the average annual tax for this purpose is two dollars. The receipt for this money comes from the prefect of police.

Thus the citizens pay directly for the sweeping of the streets directly in front of their houses, but the city carries away the sweepings. This labor is now done by contract. The sweeping costs $300,000 annually. The contractors who carry off the rubbish, after allowing it to rot a certain time in pits, sell it as manure, at the rate of three to five francs the cubic yard, and realize a total sum on its sale of $700,000. The direct superintendence of the street sweeping is confided to officers responsible to the city government. The number of scavengers employed in this work in Paris is 2,500, including both sexes. They are divided into four legions, comprising twelve battalions, or thirty-six companies of four sections each.

The persons found employed in this work are almost exclusively

Alsacians and Germans, but very many of them speak French as well. They are not at all miserable looking people, as one sees employed in similar labor in other cities, but, for the most part, young or middle-aged persons in apparent robust health, The men are paid twenty-four sous (or cents) per day; the women twenty sous, and the children sums in accordance with the labor they are capable of performing, for here street sweeping, like other of the menial occupations, is elevated to the dignity of a science, and is learned by an apprenticeship. The sweeps collect at given points, in companies of forty to sixty, every morning before four o'clock; they take their places in rank two by two, men and women, and the roll is called and the absent ones marked; at four o'clock they are all at their work. The work is performed by means of long switch brooms.

They finish at or before eight o'clock, accomplishing the work in four hours. These hours are fixed, and invariably at eight o'clock the carts carry off the rubbish; no rubbish from the houses can be thrown into the streets after the hour fixed for the carrying off of the street sweepings.

At eight o'clock in the morning the fountains are opened and the gutters are filled for an hour or more with streams of pure running water, a measure that is repeated in the course of the day according to the wants of the season; and all this is accomplished every morning without confusion, and with the regularity of clock-work, a result due entirely to a careful organization and efficient superintendents.

The streets of Paris are thus always as clean as well-used brooms can make them. There are no relaxations, no experiments; it is a regular system, which works from January to January with the same daily efficiency, and is never the cause of complaint from any source. It is not regarded as an extraordinary feat of administration, and any inefficiencies in its performance would be a matter of surprise. Besides this, a certain number of workmen called cantonniers, are employed all day to work on the streets, to scrape up the accumulating dirt, and to keep the gutters clear. A certain number of carts are retained all day to carry off the sweepings of these cantonniers. The sweeping of the public squares and gardens is done exclusively at the charge of the city.

REFUSE MATTER.

The question as to the proper disposition of refuse matter, involves some of the most important considerations with which sanitary authorities have to deal. While it is true that, in the grand economy of nature, nothing is really wasted, yet it is also true that much of what is known as waste material fails to find its way into those channels where it is absolutely needed to supply the drain constantly at work, exhausting the elements of fertility in the soil, by which food is supplied to man. Hence arise the questions of utilizing this waste.

The problem is a difficult one to solve, since there is required the active co-operation of many separate interests; but more difficult than all else is the task of impressing on the popular mind the great necessity of some unity of action in the solution of this problem.

The points involved are.

First. The thorough removal from the city of every kind of decomposing matter, either animal or vegetable.

Second. To conduct such removal as not to endanger the public health.

Third. The utilization of refuse matter so that its economic value shall not be sacrificed.

Fourth. To conduct this utilization with a due regard to public health.

It would extend the limits of this report too far to discuss in detail all the important suggestions that present themselves in the consideration of this subject.

That the vast amount of excremental matter which now passes through the sewers into the river and then to the sea, and lost forever to the soil, should be saved, and through it the soil receive back the elements of its fertility, there can be no question.

This can be accomplished by means of a low level or intercepting sewer.

In the case of tenement houses where, from the carelessness and neglect of irresponsible persons, all but the most simple privy arrangements invariably get out of order, it would be better, both for health and economy, that the contents of privy vaults should be removed during the night, and at stated intervals, and conveyed to boats ready

to receive it, for the purpose of utilizing it and preparing it for fertilizers.

The great difficulty which the offensive nature of all utilizing processes offers to the economic use of refuse matter, can be obviated by determining upon a locality where all the industrial pursuits arising from this source can be carried on without annoyance or damage to health.

I can conceive of no better location than the shoals in the lower bay. A quarantine establishment has been successfully constructed in that vicinity, and there is no reason why all the business growing out of or pertaining to refuse material, bone-boiling, fat-boiling, poudrette manufacture, glue-making, etc., cannot be carried on with success and profit in that locality.

In connection with this subject may be mentioned the offensive condition of a large portion of what is known as vacant lots in the upper portion of the city. Property of this character is generally in the hands of speculators, and constantly changing owners, until it is finally occupied and built upon. In the meanwhile they are a fruitful source of disease, and they become receptacles for refuse and decomposing materials. There is no reason why a law should not be enforced to compel all owners of vacant property to surround the same with an inexpensive open fence, and then certain inducements, such as a modification of taxes, be offered to the owners for planting trees in the inclosures. There is a general law of this character applying to residents in the country, who have a certain amount of tax remitted for planting trees on the side of the road. Where an extensive area of ground is exposed to the elements and not cultivated, a large amount of rank unhealthy vegetation springs up, stagnant water accumulates, and miasma is generated. The planting of trees will in a large measure obviate this trouble; the roots will absorb the water and the leaves the miasma, while the general appearance of the city will undergo a wonderful change, presenting the aspect of parks and gardens where now are squalor and disease.

PASSENGER TRANSIT.

The general adoption of street cars as a means of transit from one section of the city to the other is a necessary result of the large increase

of population, and the peculiarly elongated shape of the city involves, in the present mode of surface transit, the occupation of these cars by many passengers living at the extreme end of the Island for a considerable length of time; hence the construction of these cars in a sanitary point of view is a matter of serious importance.

An ordinary sized car has seats for twenty-two passengers, and these seats are generally occupied, and, at some period of the day, there are nearly as many passengers standing as seated. That is to say, between forty and fifty persons are not unfrequently conveyed in vehicles which measure six hundred and thirty cubic feet of space, and such is the construction of these vehicles that frequently in cold or stormy weather every opening into the outer air is closed.

The effect of a constant use of this mode of conveyance twice a day, upon those persons who are, from the force of circumstances, compelled to accept this sole means of transit, cannot but be injurious in the highest degree. The stupor which is observed to fall upon a large proportion of the passengers who occupy the cars for any distance, is sufficient evidence of the evil result, even if reason did not teach us that it is impossible for a number of persons to breathe each other's foul exhalations without being contaminated. Many cases of contagious disease have been traced directly to these cars.

Two remedies for these evils present themselves; one is to improve the construction of the cars as now used, the other is to improve the mode of transit, particularly to secure a more rapid mode, since most of the sanitary evils are due to the length of time during which many passengers are compelled to occupy these cars.

PRESENT CONSTRUCTION.

Nearly every street railway has adopted a style of car peculiar to itself, all, however, having the same general character. Some are superior to others, both in ventilation and lightness of construction. But there are some cars, particularly those of the older patterns, and which have been long in use, that have the same effect as would be experienced in riding over a common road in a wagon without springs, producing a constant shock upon the nervous system which must be injurious.

In the matter of ventilation, none of them are what they should be. The little traps at each end and at the sides of the roof, would be of some use if they were always open; but they seldom are. In wet or stormy weather they are always tightly closed, since they admit rain or snow if even slightly open. In some cars there are no end ventilators whatever. Every car should be provided with two revolving ventilators in the roof, which will not admit the rain, but produce a constant draught. One of these should be at each end, and in addition the lamp boxes at either end of the car should have at the base a perforated rim which will enable the heated air of the lamps to draw off in its ascent a large amount of foul air, which would otherwise accumulate within the car.

More attention should also be paid to the construction of the car, so that there should be more elasticity to the springs. Many diseases are incident to constant and repeated shocks upon the nervous system, and nothing is more positively hurtful to the nerves than the daily habit of riding in a vehicle without springs, driven rapidly. The springs are probably injured by overloading the cars, but they should be constantly inspected and replaced when they are no longer of use.

There should also be a small slide at each end of the car for receiving money from passengers standing on the platform. The front door of a car in stormy or cold weather should never be opened, since there is always thrown suddenly upon the passengers by this act a volume of cold air many degrees below that of the interior, producing a sudden chill, which to delicate persons, especially females and children, cannot fail to be injurious and oftentimes fatal. The lower limbs particularly are in this way exposed to the infliction of chilblains and rheumatism in a manner which is in reality most cruel and barbarous. There have been too many cases of disease traced directly to the street cars to leave any doubt as to the necessity for sanitary laws which shall effectually protect the health of those who are compelled to use this mode of conveyance.

RAPID TRANSIT.

Many of the evils arising from this source would be obviated if a safe, convenient, and rapid mode of transit could be accomplished. This is a problem which the great and growing necessities of the case have

given rise to innumerable attempts at a solution, some remarkable only for their ingenuity, others for the colossal nature of the conceptions, and many of them are only distinguished for the skill with which human greed seeks to speculate on human necessities.

If this question of rapid transit were one which could be left entirely to the engineer, under the requirement simply to fulfil in the most economical manner the three conditions of speed, safety, and convenience, the problem could be speedily and simply solved, but the peculiar topography and restricted limits of the city involves with this question the all-important one of the rights and conveniences of the owners of property. And thus there are obstacles presented at the outset which seem almost insurmountable; nevertheless there have been two plans suggested which seem to overcome this obstacle, while, at the same time, fulfilling the requisite conditions. Both are distinct, both are feasible, and both are necessary, each supplying facilities peculiar to itself, and each an apparent component of the other.

One of these designs proposed an elevated railway along the bulkhead line and around the entire city. The other proposed an interior line by means of a sub-railway immediately beneath the present tracks of the Third avenue railway, and following that line from one terminus to the other; to be moved by stationary power, lighted and aired by an open grating between the two tracks as at present laid, and further ventilation secured by artificial means in connection with the stationary engines.

Neither of these interferes in any way with personal rights, and by both methods rapid, safe, and convenient transit are secured.

The plans are here referred to simply in connection with the sanitary questions involved, and in that connection seem to be worthy of consideration.

PLAN OF WHARF IMPROVEMENT SHOWING LOW-LEVEL SEWERS &c.

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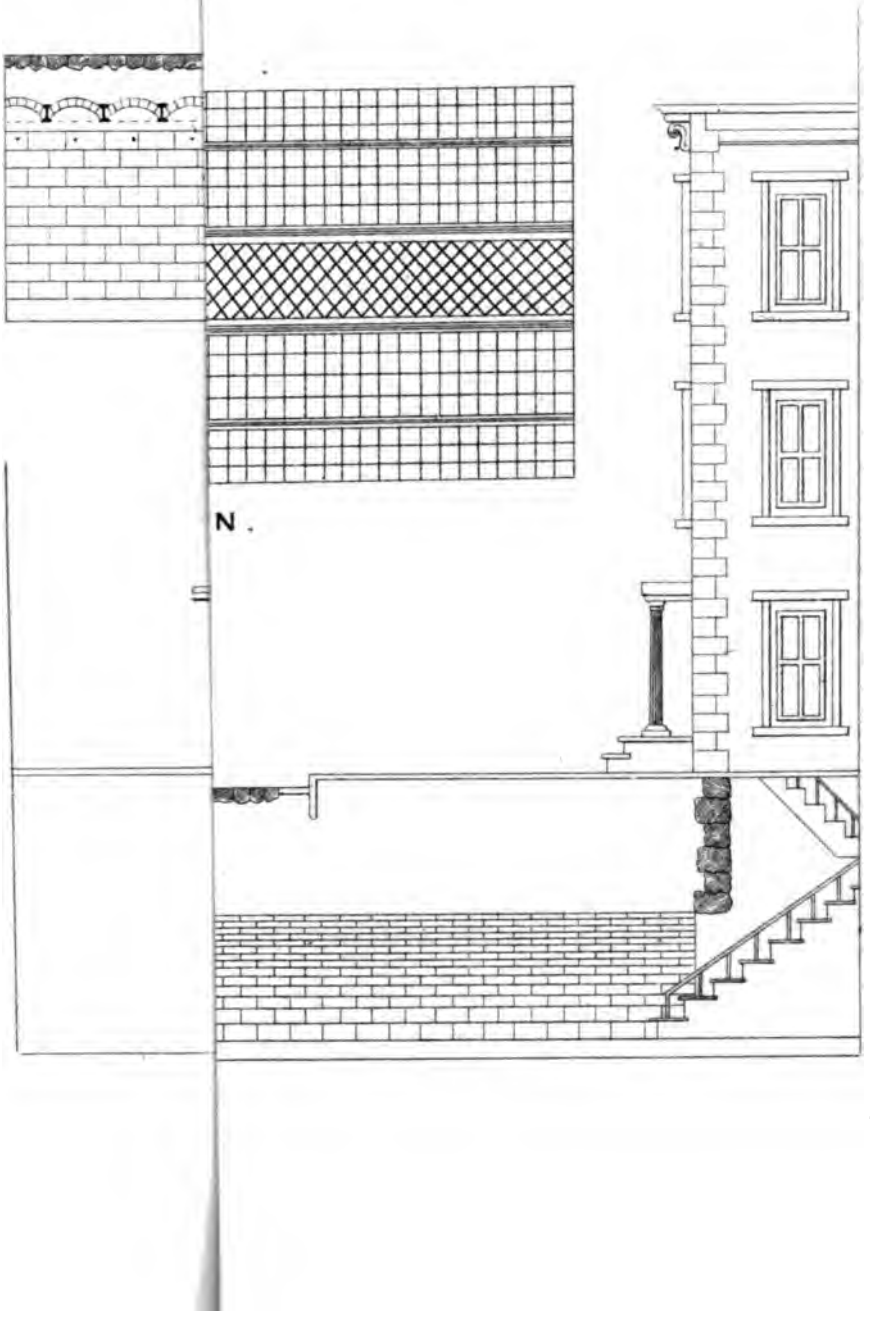


REPORT OF THE ENGINEER

ON

SANITARY ENGINEERING, AS CONNECTED WITH CIVIL IMPROVEMENTS.

HEALTH DEPARTMENT, NEW YORK,
ENGINEER'S OFFICE, January 30, 1871.

G. CECCARINI, M.D.,

Chairman Sanitary Committee:

SIR—In compliance with the following resolution of the Health Department of the 20th October—

Resolved, That the Sanitary Committee be and is hereby directed to prepare, in time for the next annual report, a report on the value and necessity of a system of drainage for sanitary purposes in the city of New York, and on sanitary engineering as connected with civic improvements,

—which you have referred to me for action, I submit the following:

DRAINAGE.

The varying character of the subsoil of this Island is such as to lead the absorbed surface-water into numerous courses or springs, as they are usually termed; and so long as the primeval condition of this subsoil is not disturbed by the dense filling out of the shores to a bulkhead line, and by the throwing of like embankments in the line of the avenues and streets across the thread of these courses, they will maintain their operation, and the land will be freed from all such surface-water as its natural conformation will admit of.

It occurs, however, that in the filling out of bulkheads and in the formation of embankments due provision has not been made for the vent of these water-courses, as is exhibited by wet and damp cellars in many parts of the city, and which condition is not alone confined to locations bordering upon the rivers, where such a result would naturally ensue from the superior elevation of tide-water flowing into the lower level of the cellars, when not constructed to resist it, but in locations at such an elevation above the rivers as to preclude the approach of tide-water, and this condition of the arrest of the flow of their courses is more fully exhibited in the numerous ponds and pools now covering extensive areas in the unoccupied portions of the Island.

Some of these pools are of primeval origin, that is, they lie below

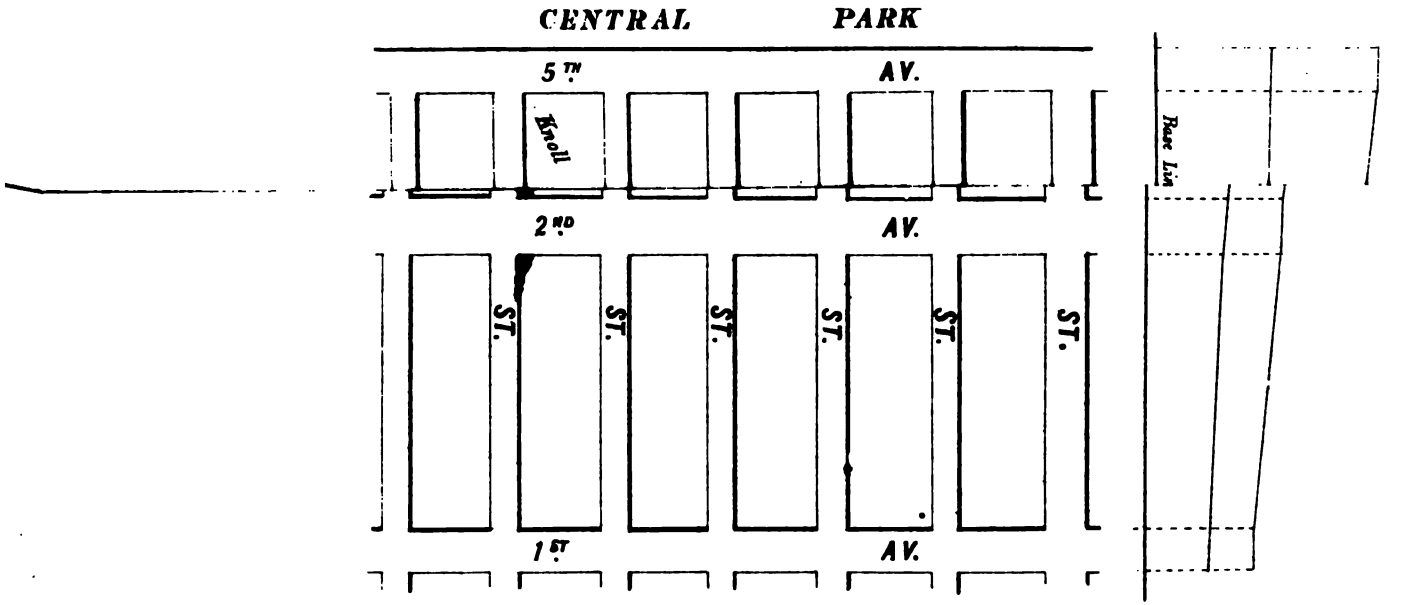
any natural outlet of sufficient capacity to discharge them; in other cases they are wholly artificial, arising from the causes already cited—the damming up of their courses.

In the progress of conforming the irregular surface of the country to the requirements of a city, permanently constructed drains should have been led from the shores to the outer face of bulkheads, and also under all embankments, whereby absorbed and surface-water would have flowed uninterruptedly to the rivers; this simple and necessary process, however, has been wholly neglected, the consequence of which is the condition of cellars, and the formation of ponds and pools, before referred to, and the saturation of the earth within the area of the source and arrest of each water-course.

With the experience consequent upon the damming up of the water-courses of the lower section of the city for a half century prior to 1842, when the Croton water was introduced into the city, it is to be much regretted that the Croton Aqueduct Department did not avail itself of the opportunity afforded it upon the introduction of its water and in the attendant construction of sewers, to have made them subsoil drains as well as sewers.

Drainage of the earth appears to have been effectually lost sight of, if not wholly ignored; the Commissioners either did not recognize the necessity of its receiving the attention it required, or they considered it as identical with sewerage, without being aware that the two operations are in every way different. A drain is a receptacle for such water as may subside from the surface of the earth or flow from adjacent courses and permeate through its numerous openings in its sides and bottom. A sewer is a close conduit to carry off sewage or offensive and insalubrious matter, facilitated in its flow by the surface water arising from rains and the waste water of tenements, etc.

The entire practice, for system there has been none, of the drainage and sewerage of this city, and the draining of its suburbs, has been so wholly at variance with propriety, so wholly opposed to the advancement of the city and the interests of its inhabitants, so wholly at variance with the science of engineering, so well calculated to drive the dwellers in our suburbs to seek more salutary locations, so effective in deterring many from returning to the once desirable residences without the city limits, so productive of disease, and involving so much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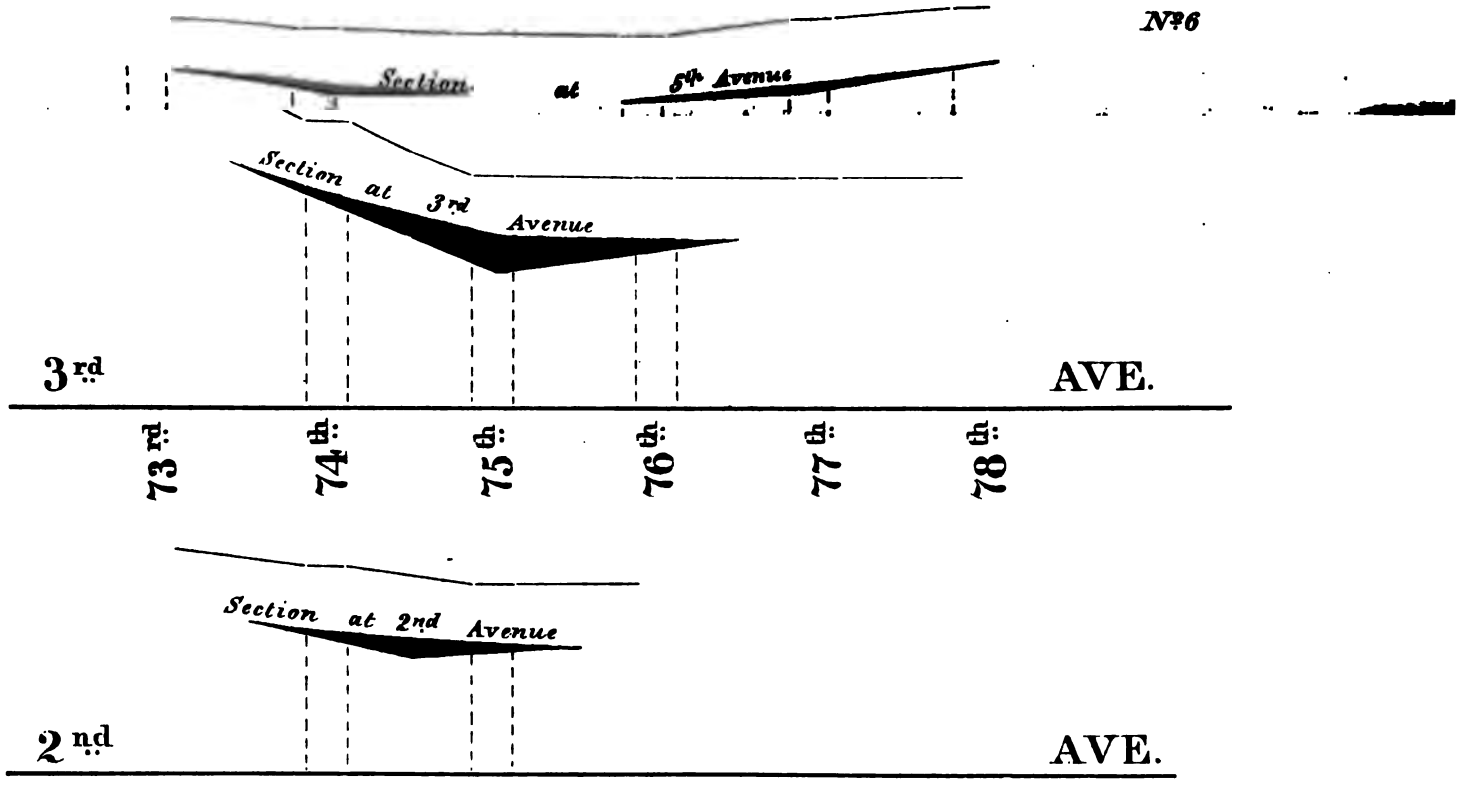
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expense to remedy the neglect, that I am embarrassed to approach the subject, from a consciousness of inability to do it that justice which the subject demands. Well may the Commissioners of the Croton Aqueduct Department, in their report to the Common Council in 1866, have used the following as expressive of their opinion upon the subject of sewers: "Nearly all of which have been built without regard to any system," and that under the provisions of an act of the Legislature of 1855, they had authority to construct sewers upon a devised system, "in place of the irregular and faulty work which has heretofore rendered our operations under this head so expensive, ineffective, and pestilential, and that to correct or even lessen the evils resulting from so many years of mismanagement is a task requiring much study, care, and time."

Upon receiving your directions to report upon this important subject, I made a reconnoissance of the Island between Forty-second and One Hundred and Fifty-fifth streets, and observed that there was not a locality which was not exposed to the malarious exhalations of a pond or pool of stagnant water, either arising from a natural flow being disturbed or diverted in its course, or from the formation of an artificial pond by the arrest of the natural subsoil courses or the damming up of surface water.

In order to illustrate the conditions referred to, I submit herewith a sketch embracing a plan and section extending from Seventy-third to Seventy-ninth street, and from the First to the Fifth avenue. Formerly, or before these streets and the intersecting avenues were opened, as it is termed, the stream that gives rise to these ponds and pools of water flowed uninterruptedly to the river; but by the process of street opening and sewering under the hitherto practice of the Street and Croton Aqueduct Departments, proper provision was not made for the flow of this water through the fillings forming the streets and avenues which were thrown across its course, and, as a consequence, the water arrested in its flow reflexes upon the land until it finds an outlet; the practice and result in this case is a type of all others. In some cases a loose or rubble opening has been left in these bulkheads of earth and stone composing the street or avenue, in others none; this loose construction is altogether insufficient, as sooner or later it becomes clogged by the subsidence and permeation of the earth above it and the wash at its sides, and eventually it becomes choked.

In very many cases the owner of a single lot of ground, looking only to his immediate requirement, has thrown over a course running through it, an imperfect and insufficient drain, without any concert of action with the owners of the adjoining lots, and upon the failure of this drain to discharge the full flow of water, the course is arrested in whole or in part, and thrown back upon the land above it, involving disease to the locality, and an unjust burden upon others to relieve themselves of the result of this arrest of the course.

In referring to the sketch, it appears that in several places the course is seven feet below the level of the street sewers, and, as a consequence, upon an arrest of the flow, the land must be covered to that depth.

Reviewing, then, this condition of the suburbs of our city, I entertain the conviction that there is no subject of general interest as yet unprovided for by legislative or municipal action, in which our citizens have a stake at all comparable to that of drainage of the land, either in magnitude of its results or in its imperious demand for immediate and effective action, and I submit the following:

First.—That the manner in which the avenues and streets have been opened has been wholly opposed to sanitary requirements, and without due regard to the circumstance that sewerage and drainage have distinct requirements and involve distinct operations.

Second.—That the drains which have been led through the avenue and street embankments are imperfect in design and insufficient in construction.

Third.—That all sewers hereafter constructed should be laid in dry rubble, in order to afford to some extent the drainage of the earth in connection with sewerage.

Finally, and as a means of meeting the requirements of the case, I further submit the following as a system of drainage:

The surface and subsoil drainage of the city to be vested in the Health Department, with authority to direct the filling of low lands, in conformity with the street and avenue grades and sewers, and also to direct the construction of drains, when they shall be necessary, to discharge the flow of water either into adjacent sewers or to the river, as may be most convenient.

That all material and work required by the Health Department in such operations be furnished under like provisions to that now required

by the Department of Public Works, and that when completed the cost thereof be submitted to the Board of Assessors, to be assessed upon the property drained.

SANITARY ENGINEERING.

Under this head may be properly classed the disposal and utilization of sewage.

Under existing constructions, the entire sewage of this city is discharged into the North and East rivers, the solid portion filling up the docks or slips, and the liquid portion to a great extent flowing over the surface of the opposite shores and flats, to emit exhalations therefrom, to the prejudice of the health and comfort of all who reside adjacent thereto.

The solid portions, in combination with such surface soil and detrital matter as is washed from the surface of the streets and soil, is dredged therefrom and transported into the upper portion of our bay, apparently under the impression that that is an effective disposal of it.

As an exponent of the insignificant volume of this deposit or silt which passes out of our bay at Sandy Hook, I submit the following extract from the details of my observations upon the subject in the years 1854–7:

"Weight, in grains, of deposits in 30 cubic inches of water from the following localities:

	GRAINS.
Sandy Hook	.109
Narrows	.265
Robbins' Reef	.367
Ellis' Island	.811

Confining my observations to the city of New York alone, and taking the deposits shown in the water from the several localities around the city, the mean amount of *silt* in every 30 cubic inches of water is as follows:

Battery	1.687
Liberty street	6.937
Canal "	8.531
Thirtieth street, East	1.265
Twenty-third street, East	2.968
Grand street	4.000
Wall "	5.187
Broad "	6.375
Thirtieth street, West	.937
	9)37.887
	4.209

From which it appears that, between Thirtieth street, East and West, and the Battery, the deposits are 4.209 grains, whilst at the Narrows it is but .265, and at Sandy Hook but .109 grains, showing very conclusively that the solid portion of the sewage, and the *silt* removed from the docks, are rapidly deposited and not borne away by the tidal currents.

In corroboration of these results, and in illustration of the effects under consideration, the proprietors of the New York Sectional Dock assure me that the deposit of *silt* upon their tanks between the piers of Market and Pike streets, averages full five-sixteenths to three-eighths of an inch in one flow of tide, and they are thereby subjected to the delay and cost of dredging under their dock to the depth of seven feet every two years.

Hence, by the elements before given, it appears that the volume of the deposit from the water in the slips of this city between Thirtieth street, East and West, and the Battery, compared with that of the water (at half tide), is as 1 to 3,610.

Startling as these results appear, it must be borne in mind that they do not give a full exhibition of the facts of the case, for the observations made were necessarily confined to the presence of *silt*, and embraced only that portion which was retained in suspension by the flow of currents, whilst the deposit of *detritus* from the flow of gravel, sand, etc., could not be arrived at, unless by a different system of observation, and it is consequently not embraced in the above results.

In order that I may not be subjected to the charge of attaching too much importance to this subject, I beg leave to submit a few of the results of investigations held by the Tidal Harbor Commission, etc., etc., etc., in England, together with the opinions of the necessity of the maintenance of the tidal volume in all maritime ports, as furnished by Calver, in his invaluable work upon tidal rivers, whose *thesis* is "that the navigable condition of the outlet of a tidal river can only be maintained by tidal water, and that its extent as to sectional capacity will be proportioned to the amount admitted."

"It is not to be forgotten that as the sands and mud accumulate, and marsh lands are formed in the upper part of the estuary, the power of scouring the lower portions (the entrance) is diminished." [*Telford, Report on River Dee.*, 1821.]

The course of remedial action most readily and effectually introduced at this time that occurs to me, is the effective cleaning of our streets and piers, in order to remove the wash into the rivers therefrom, and putting an end to the present practice of depositing the dredging of our slips into the channel of the rivers; and I opine that no one who gives the subject his attention will, for a moment, permit the temporarily increased expenditure consequent upon the measure here suggested to be weighed for a moment, or in value, with the advantages to be derived therefrom.

The operation of dredging slips as now performed is briefly as follows: the deposits in the slips are removed to the channels of the North or East rivers, when the *silt* or mud is swept by the current of the tide back to the slips and upon the flats of New Jersey and Long Island, and the stones, bricks, and such other matter too heavy to be moved by the detrital action of the current, fill the channel in proportion to their volume.

The opinion appears to prevail with the public that the discharge from our sewers and the deposit removed from the slips into the rivers, are *washed*, as it is termed, into the sea and Long Island Sound; if this were the operation it would be well for the interests involved in the subject under discussion; but as it happens, a very brief examination of the case presents a very different result. Thus, the deposit in our slips, *i. e.* mud, independently of stones, bricks, etc., is composed of gravel, sand, clay, and feculent matter, which when transferred to the channels of the rivers is submitted to the detrital action of a current of from one to four knots per hour, 18 miles distant from the sea; with these elements, then, it would be difficult to show how any portion of this mud, other than the soluble part of it, and the coloring matter therein, could ever reach Sandy Hook.

A review, then, of the elements submitted, and a consideration of their operation furnishes the following deductions:

First.—That the deposit of *silt* and *detrital* matter into the rivers bordering this city is so considerable in amount that the slips of this city are very rapidly being filled, the bays, indentations, and flats upon the shores of Long Island and New Jersey, the Harlem river, and all places where the currents are comparatively feeble, are being rapidly silted up by the tidal currents, and along with the accretions of the

wash upon the shores of our harbor, the tidal volume thereof is being reduced, upon the extent of which tidal volume depends the volume of water passing the bar at Sandy Hook, a point involving the commercial value, if not the physical existence, of this harbor.

Second.—That the system of the dredging of our slips as now pursued, viz., the removal of the deposits therein from below low-water depth, to be exposed to the currents in the rivers, ends in but a transfer of them to other slips and shoal places; the effect of which is to involve the loss of time and cost of a re-removal of the deposits from the slips.

Third.—That by the thorough cleaning of the streets and piers of this city, Brooklyn, and neighboring cities, that the deposits into the slips would be lessened, and the necessity for dredging them would be rendered less frequent.

Leaving the disposal of the silt of our docks or slips that has already accumulated there to the Department to which it properly belongs, and which Department, in its purpose and capacity, is fully adequate to meet the case, I will confine my views to the arrest of this deposit for the future, which operation comes legitimately within the consideration of your Committee.

The contour of the city, bounded by rivers on all sides, meets the problem of arresting its sewage at the embouchure of the sewers, under the most favorable circumstances for removal and utilization, for if there was constructed a line of sewer along the river fronts, with receptacles at such frequent intervals as would give the necessary inclination to them to afford the flow of the sewage into them, the entire sewage of the city would be received therein, from which it could be taken up into suitable vessels and transported to be utilized in agriculture.

The result of the deposit or discharge of the sewage into our docks or slips, involves both the sanitary requirements of a populous city and neighborhood and the injury of the harbor.

Of the injurious effects of the sewage being deposited into a river, I submit the following:

The Sewage of Towns Commission of England, in their report of 1858, make the following statement:

"The discharge of a large body of sewage into a river is frequently not only productive of nuisance and disease to the neighborhood where it takes place, but its influence extends to distant populations."

And in their report of 1861, they further state:

"With regard to the Mersey, there is said to be evidence already that the bed is raised—that the deposit has permanently much increased. At Bath the discharge of sewage into the Avon is said to have so increased of late years as to impede navigation. The drainage of Glasgow is stated to produce deposits in the harbor of the Clyde at the rate of 100,000 cubic yards yearly, and to entail an expense of £8,000 per annum for its removal."

In 1867, the Thames Conservatory Board reported to the Metropolitan Board of Works, "the formation of extensive shoals in the river Thames outside the main drainage outfalls."

In order to illustrate how fallacious is the received opinion that our rivers carry all sewage matter to the sea, it was clearly shown by the repeated experiments of these distinguished engineers, that in the river Thames sewage discharged into it two hours after high water reached the same point upon the next flood tide that sewage discharged into it two hours before the previous high water.

Of the value of sewage when utilized, the River Pollution and the Sewage of Towns Commissioners of England, and other authorities, furnish the elements from which Corfield, in his Digest of Facts relating to the Treatment and Utilization of Sewage, presents the following:

The total estimated value of the annual excreta of an average individual, of a mixed population of all ages and sexes, ranges from $1.62 to $2.02.

The average volume of sewage per inhabitant of a city per annum is about seventy tons, the value of which is four cents per ton, and estimating the population of this city at one millon, the value of its sewage would be $2,800,000.

The estimates of Liebig and Ellis put the average volume at one hundred tons, upon which basis the value would be $4,000,000.

Mr. Smith, of England, in reporting to the Commissioners for Inquiry into the State of Large Towns and Populous Districts, stated that 18,000 gallons of sewer water was equal in fertilizing effect to two and a half hundredweight of guano, or fifteen tons of farm-yard manure.

History records that the city of Jerusalem was not only sewered, but the sewage was utilized.

In Edinburgh sewage has been temporarily applied to the surface of

adjacent meadows for over one hundred years, and there were twenty-four towns in England in 1867 in which the sewage was utilized.

In one town in England since the sewage of it has been utilized, the average mortality has decreased from 21.84 per centum to 15.13, in the second year of the introduction of the system.

The principal nations of Europe are moving in the matter of utilizing sewage, both on account of its sanitary and economic results, and, in my opinion, it has become an imperative duty to consider in what manner the varied but combined interests of health, commerce, and economy can be best attained by a digest of a system of the sewerage of our city, and in order to arrive at the elements of decision and action, I suggest that the matter be referred to the Departments of Public Works, Docks, and Health, to consider and report upon them.

It is much to be regretted that the combined subjects of the drainage and disposal of sewage of this city has failed to receive that attention from the public which its importance demands. It is not all-sufficient for a populous city, alike to ours, that it should have a plentiful supply of water, a police department, public parks, and properly constructed piers and docks; the health of the citizens thereof, and the commercial facilities of our harbor, are second to none of the above provisions.

I have the honor to be, respectfully,

CHAS. H. HASWELL,
Engineer.

DRAINAGE OF LANDS

BOUNDED BY SEVENTY-FOURTH AND SEVENTY-SIXTH STREETS, AND FIFTH AVENUE AND EAST RIVER.

NEW YORK, August 1, 1871.

The Sanitary Committee, in reference to the following reports of Assistant Health Inspector Viele and the City Sanitary Inspector Morris, respectfully report, that on a personal inspection of the undrained district mentioned they have found the statements of the aforesaid officers fully corroborated by the actual state of facts, and therefore not only join in the recommendations of the said officers, but regard the thorough drainage of said district a matter of urgent and absolute necessity.

Numerous private dwellings not only are rendered unhealthy, but the premises of the German Hospital and of other public institutions in that neighborhood are soaked with a fever-breeding fluid, not to speak of the numerous pools of stagnant water continually created on the surface of the ground. The level of the sewer being above the water courses complained of, the only effectual remedy, in the opinion of your Committee, is an underground drainage from the neighborhood of Fifth avenue down to the East river.

Your Committee, therefore, recommend that a copy of these several reports be forthwith transmitted to the Department of Public Works, with the urgent request of an early attention to this alarming deficiency in our system of drainage. As yet the district in question is but partially built on, and its effective drainage will cause a comparatively small expense; if left, however, in its present state for another number of years, the cost of draining it will not only be considerably enhanced, but the improvement may eventually be rendered practically impossible.

G. CECCARINI, M.D.
STEPHEN SMITH, M.D.
MAGNUS GROSS.

M. MORRIS, M.D., *City Sanitary Inspector, Health Department:*

SIR—In repeating report in reference to the drainage of the section lying between Second and Fourth avenues, between Seventy-fourth and Seventy-sixth streets, permit me to call your attention to the most and all important portion of the former recommendation.

This section, as shown by topographical map (heretofore submitted), is a valley through which there was "an original water course," which, in course of the opening and filling of streets, became obstructed and diverted from its original course. The most serious obstruction was effected where the stream crosses Second avenue at Seventy-fourth street, causing an accumulation of water of sufficient magnitude to overflow nearly the whole surface of four squares. This water, becoming stagnant, has for years been a source of great evil and the cause of much sickness, as intermittents prevail to an alarming extent in the neighborhood. An effort was made last year (with partial success) to obviate and remove this great barrier to the prosperity and health of this section of the city. Many of the lots have been filled, covering up and hiding from the view a large quantity of this stagnant water; but it still remains (although hidden) as much of an evil as before. With a constant and never failing supply of water from the natural springs, this ground is always to remain saturated with water, unless there is provided an outlet underneath Second avenue. Sewers in Second, Third, and Fourth avenues, also in Seventy-fourth and Seventy-fifth streets, are all too high to receive this

accumulation, and it would be idle to attempt the filling of lots to a level of the sewers, as all the understrata would remain a nucleus for malaria poison.

I would recommend that the old drain once constructed under Second avenue at Seventy-fourth street be opened and repaired, or reconstructed, so as to allow the free escape of all waters originating along these various sources, and which are the cause of the accumulation, and which, if not provided for, will continue for all time to cause disease and death. This drain opened, and a continuous drain to connect with the culvert under Third avenue, and also its continuation west of Third to Fourth avenue, together with the completion of the filling and grading of the square, as is now partially complied with, will correct a long neglected evil.

Respectfully submitted,

AUGST. VIELE, M.D.,
Assistant Inspector.

BUREAU OF SANITARY INSPECTION,
July 8, 1871.

This communication from Assistant Health Inspector is one of very great importance. The question of subsoil drainage at this point involves the health of the residents now and in future of this section of the city. The bottom land being springy upon the blocks from Seventy-fourth to Seventy-sixth streets, between Fifth avenue and East river, will always be wet and unhealthy unless some means of subsoil drainage is provided before the lots are filled up to the level of the present street and avenue sewers, and built upon. I would therefore respectfully recommend that this matter of drainage be specially referred to the Board of Public Works, with the request that a proper system of drainage be at once commenced and carried out from Fifth avenue to East river, following the bed of the old natural water course.

Respectfully submitted.

MOREAU MORRIS,
City Sanitary Inspector.

REPORT ON CASUALTIES FROM STREET RAILROAD CARS.

Commissioner Stephen Smith from the Sanitary Committee submitted the following report upon casualties occurring to persons getting on or off, or falling from the front platform of street cars:

The Warden of Bellevue Hospital, Hon. Thomas S. Brennan, reports the following list of casualties occurring to persons while attempting to get on or off, or from falling from, the front platform of the city street cars, admitted to that hospital during the year 1870.

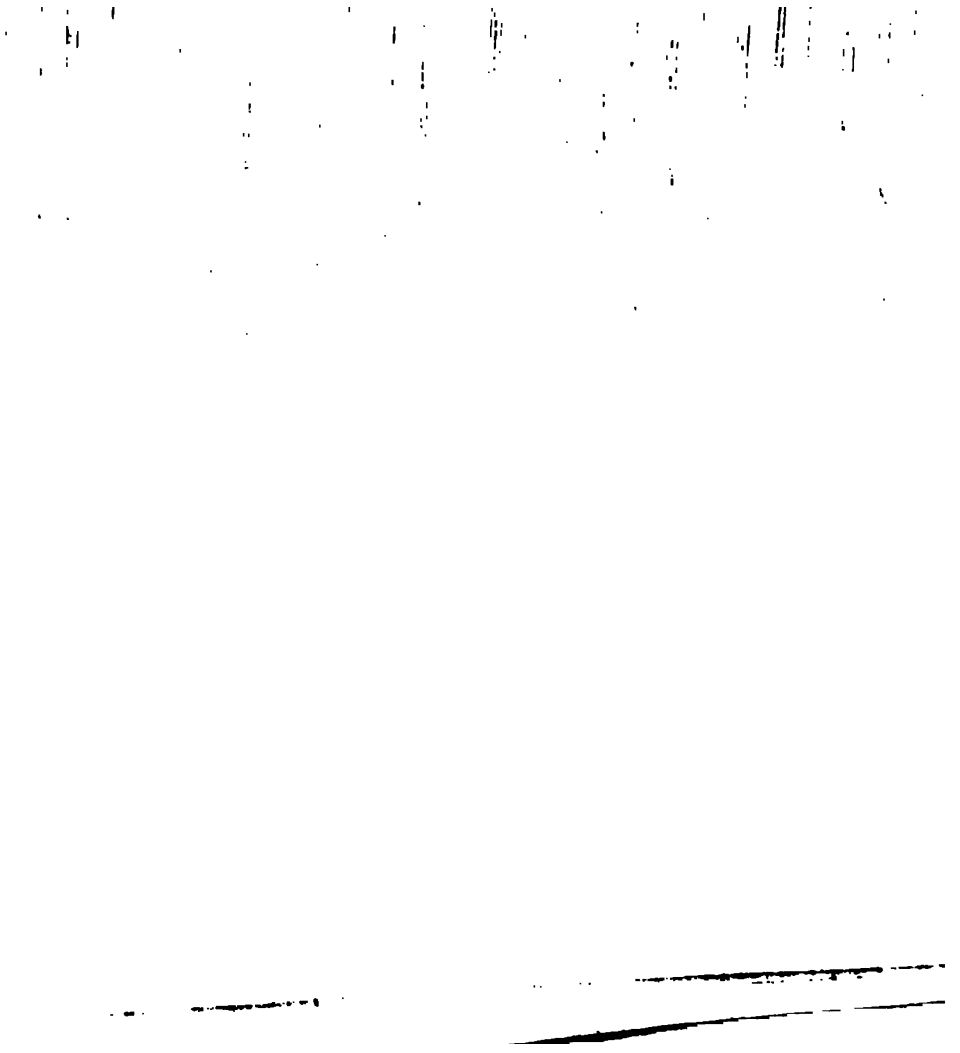
BELLEVUE HOSPITAL, January, 1870.

STEPHEN SMITH, M.D.:

SIR—Following you will find a correct report of accidents on front platforms of city railroad cars for the year 1870:

DATE.	NAME.	LINE.	REMARKS.
Feb. 12	George Egan, died February 4, 1870.....	B'way and Broome.	Bro. fr. corner Mercer and Broome, run over by car 54, while getting off from front platform. Laceration of thigh and leg.
April 3	Frank Kiernan, died April 24, 1870.....	Tenth av.	Bro. fr. corner Morris and West streets, run over by car 31, while getting off front platform. Fractured right leg, and compound fracture of left.
April 30	John Pye, discharged May 7, 1870.....	First av..	Fell from car corner of Seventeenth street and Avenue A, stepping off front platform. Dislocation of hip.
May 2	John Reilly, discharged May 20, 1870.....	Second av.	Fell stepping off front platform of car at Sixteenth street and Second avenue. Injury of hand.
May 4	Joseph Ryan, discharged July 1, 1870.....	Third av..	Fell stepping off front platform of car 81; car went over his foot. Injury of foot.
July 8	Thomas Finley, discharged July 12, 1870.....	Fourth av.	Fell getting off front platform Madison and Fourth avenue car. Injury.
May 19	Carl Dasher, died May 23, 1870.....	Second av.	Had foot injured stepping off front platform of car 50. Exhaustion.
June 5	Wm. Seamen, discharged June 27, 1870.....	Third av..	Run over by car 128; thrown from front platform by conductor. Compound fracture of arm.
June 26	Wm. McGrath, died June 27, 1870.....	Eighth av.	Fell getting off front platform of car 39, receiving compound fracture of tibia and fibula.
July 5	Catherine Cronin, discharged July 14, 1870..	E. B'way.	Received fracture of leg getting off front platform, corner of Catharine street and East Broadway. Conductor would not stop.
Aug. 13	James Maher, discharged October 21, 1870.....	C. P.....	Received injury of foot jumping off front platform of car 108, Central Park line. Injury.
Aug. 21	Lewis Woide, discharged September 19, 1870....	Second av.	Received compound fracture of foot jumping off front platform of car 2. Compound fracture of foot.
Sept. 10	Jacob Downey, discharged September 14, 1870.	.....	Was pushed off car, and run over. Fracture of fibula.
Oct. 24	Thomas Farrell, discharged November 22, 1870.	Third av..	Thrown from Third avenue car by conductor, receiving injuries.
Oct. 17	James Adams, died November 24, 1870.....	Third av..	Bro. from Third avenue and Twenty-fifth street, run over by car 51, trying to get on front platform. Injuries.
Oct. 29	Wm. Justice, discharged November 16, 1870....	Bl'ker st..	Fell from Bleecker street car while getting off, receiving compound dislocation of elbow.
Nov. 26	Mary Williams, discharged December 21, 1870..	Tenth av.	Thrown from car by conductor before it stopped, receiving injuries.
Dec. 30	Alfred Shears, died January 4, 1871.....	Third av..	Fell from front platform of Third avenue car, receiving compound fracture of tibia and fibula. Leg amputated, and died of tetanus.

From this table it appears that eighteen cases of injury occurring from falling while attempting to get on or off, or from being pushed off the front platform of the street cars, were admitted to this single hospital during the past year. Of these, six died, giving a mortality of 33⅓ per cent. The nature of the injuries was as follows: fracture of the thigh



to render them directly inaccessible to persons on the street, and to prevent persons already upon them from getting off or falling off.

It may be alleged that this is not a proper subject for an ordinance of this Board—as the remedy for the evil complained of is to be found in the courts, where every person suffering from these accidents can obtain redress, and that in attempting to get on or off the front platform of street cars when the car is in motion the person is himself culpably negligent. Admitting the truth of these statements, it does not follow that this Board has no duty to perform in the premises. On the contrary, the statute expressly includes among the powers of this Board "the ordering and enforcing, in the same manner as other orders are provided to be enforced, * * * the prevention of accidents by which life or health may be endangered" (last clause sec. 12, chap. 74, laws 1866). In its ordinances the Board recognizes this power, and has ordained: "Nor shall any person omit to do any act, or to take any precaution reasonable and proper, to prevent or remove danger or detriment to the life or health of any human being" (last clause, sec. 8, Code of Sanitary Ordinances).

The propriety of legislation to prevent accidents by which life or health may be endangered, even though such accidents could occur only through the negligence of the individual, has long been recognized. Ferry and steamboat companies are obliged to regulate their course and speed with direct reference to the safety of their passengers; railroad companies have to use proper precautions at street crossings to prevent accidents; places of amusement, manufactories, etc., etc., are required to provide against accidents of every description. The Legislature of the State of Missouri seems to have fully appreciated its duty and its obligations to prevent the horrible and fatal accidents by street cars, now of such frequent occurrence in this city, by the following enactment, passed February 6, 1866: "Sec. 10. No passenger shall be permitted to get on or off any car by the front platform while the car is in motion; and each car shall be furnished with such adjustable gate or guard as shall effectually prevent it."

The Committee respectfully recommend the adoption of the following ordinance:

That each of the several persons and companies that run or cause to be run any car drawn by horses for the transportation of passengers in

any part of the city of New York, do cause both the front entrances from the street upon the platform of the fore end of each of said cars to be effectually barred or closed by gate or otherwise, while said cars are in motion, so as to prevent access to any portion of the said platform, or the hand-rails or the steps thereof, by any person not upon such car.

NEW YORK, April 19, 1871.

REPORT ON RELAPSING FEVER.

REPORT OF THE SANITARY COMMITTEE ON RELAPSING FEVER, BY STEPHEN SMITH, M.D.

The most important event in the sanitary history of New York during the past year was an outbreak and epidemic prevalence of relapsing fever. This was the first recognized appearance of that disease in New York, and naturally it attracted much attention from the medical profession and from the sanitary authorities. To the medical profession it afforded the long sought opportunity of critically examining a disease which hitherto had been studied in this country only in books. Its clinical history was carefully observed and recorded in the public hospitals by the most eminent members of the profession of this city.

Nor was the appearance of this fever of less interest to those medical men who studied it chiefly from a sanitary stand-point. To them it presented a new form of contagious disease, which from its very nature demanded special sanitary care and treatment. As it spread chiefly by the contact of the sick with the well, it was directly amenable to the most simple measures of prevention. Again, its victims belonged for the most part to that class of destitute persons, vagrant or homeless wanderers, who are proper subjects for control by the constituted health authorities.

The knowledge gained by the profession as to the nature, symptoms, diagnosis, anatomical lesions, treatment, and general peculiarities of relapsing fever as it appeared in an epidemic form in this country, though not differing materially from that already recorded, will, nevertheless, add an interesting chapter to the literature of the fevers of the United States. The experience of sanitary authorities in regard to its mode of propagation, and the kind and value of preventive measures are important, and largely increase our faith in the principles of preventive medicine when judiciously applied.

The Sanitary Committee have endeavored to embody the results of this twofold study of relapsing fever in the following report. The object sought is to put on record for future reference a history of this new epidemic disease, especially as it appeared in New York in 1869–70, together with the measures adopted to control and suppress it. The committee are largely indebted to Dr. ELISHA HARRIS, Sanitary Superintendent of the Metropolitan Board of Health, for the materials which form the body of the report.

PREVIOUS HISTORY OF RELAPSING FEVER.

Relapsing fever, though now first epidemic in this country, is no new disease. In the works of many writers on typhus epidemics during the last century and a half, there are sufficiently accurate descriptions of relapsing fever to prove that this disease was present, but undistinguished from the prevailing typhus. A great variety of names were accordingly given to it, such as: *short fever*, *fever of short periods*, *five or seven days' fever*, *a five days' fever with relapses*, *remittent fever*, *seventeen day fever*, *typhus recurrens*, *synocha*, *relapsing fever*, *famine fever*, *hunger fever*, *die hungerpest*, etc. It is believed that the fever which Hippocrates described as prevailing two thousand years ago in the island of Thasus, off the coast of Thrace, resembled it very closely in most of its characters, including an intermission of five or seven days between the febrile attacks, jaundice, epistaxis, tendency to miscarry, etc. (Spittal, *London and Edinburgh Journal*, vol. 4, Murchison.) The first authentic description of the fever is attributed to Dr. Rutty (*Chronological History of the Diseases of Dublin*), who, speaking of the fever of 1739, says: "It was attended with an intense pain in the

head. It terminated sometimes in four, for the most part in five or six days, sometimes in nine, and commonly in a critical sweat; it was far from being mortal. * * * * * * The crisis, however, was very imperfect, for they were subject to relapses, even sometimes to the third time. In some there succeeded pains in the limbs." The same fever, according to his account, prevailed in 1741–5–8.

In 1777 it was epidemic, also in 1797–1801; Barker and Cheyne state, "that the fever in 1801 very generally terminated on the fifth or seventh day by perspiration, and that the disease was then very liable to recur, and that the poor were the chief sufferers by it." Murchison says that "there is evidence of the occasional occurrence of relapsing fever during the first sixteen years of this century, in Ireland and elsewhere, while the next great epidemic of fever (1817–19) was chiefly composed of it." The next appearance of relapsing fever was in the epidemic of 1826, when both typhus and relapsing fever prevailed. A distinction was now drawn between the two fevers, typhus being called "fever of the old constitution," and relapsing fever "a fever of the new constitution" (O'Brien). From 1828 to 1842, relapsing fever disappeared from Britain, but its disappearance from Ireland was not so complete (Murchison). In 1842–3 an epidemic of relapsing fever prevailed in Scotland, and to a less extent in England. This epidemic was of local origin, beginning on the east coast of Fife, in 1841–2; it spread during the years 1841–2–3–4 until it became general over Scotland, not being restricted to large towns. It was during the epidemic of 1843 that the special characteristics of relapsing fever were critically examined. Professor Henderson, of Edinburgh, first drew the line of demarcation between typhus and relapsing fever, and rendered probable what Dr. Jenner subsequently demonstrated conclusively, viz.: the independent nature of relapsing fever, to which the latter gave the name by which it is now known. From 1843 but few cases of relapsing fever were seen in Britain and Ireland until the last three months of 1846, when the epidemic of 1847–8 was ushered in, in Ireland. It was an epidemic of typhus at the commencement (Lyons), and of relapsing fever towards its close, and spread generally over Ireland, and prevailed principally among the Irish residing in the towns of Scotland and England. It was also conveyed by Irish emigrants to America. "Since the epidemic of 1847–8," Murchison says, "relapsing

fever has been gradually disappearing, and for the last seven years or eight years (1862) not one case has been observed in the hospitals of Edinburgh, Glasgow, or London." This immunity from the fever continued until 1868, a period of fourteen years.

Relapsing fever does not seem to have been met with on the continent prior to 1847 (Murchison), when it prevailed in the Silesian provinces of Prussia and Austria as an epidemic, and was investigated and described by Virchow, Dümmler, and Suchanek. It also appeared among the British troops in the Crimea in 1855 (Lyons).

In 1854 an epidemic of relapsing fever appeared in Peru, and in 1859 it was reported to have reached Bolivia, and the neighboring states of Chili (Baldon). The mortality was 250 in 1,000, viz.: children under 16 years, 92; adults, 110; over 60 years, 48. In 1858 the fever was reported to have visited New Archangel, in Russian America.

From this period we have no knowledge of the prevalence of relapsing fever in any quarter of the globe, until the latter part of 1864, when the great epidemic appeared, which has so recently overspread many portions of Europe, and reached our shores. A brief history of this epidemic is important, as illustrating its course and progress.

In August, 1864, an epidemic of typhus and relapsing fever appeared in St. Petersburg, and created great alarm, as the nature of the fever was not at first recognized. The number of admissions of fever to the civil and military hospitals from August, 1864, to March, 1865, was 7,097 typhus, and 7,625 relapsing fever.

The fever assumed a malignant character, and during the spring of 1865 caused great alarm, and gave rise to many useless efforts for the enforcement of quarantine regulations against it throughout Northern Europe. Notwithstanding these efforts, and a certain kind of popular but badly applied knowledge concerning the infectious character of the fever, it soon became prevalent in various towns of Poland, and throughout the ports of the Baltic provinces.

Herman (*Petersburger Med. Zeitschrift*), whose observations are based on studies in Obuschoff Hospital, states that in 1866 relapsing fever had attacked an equal number in Northern and Southern Russia. There was no decrease of the fever at that time in St. Petersburgh. The admissions to hospital in 1864 were 1,085, of whom 125 died; in 1865, 3,082 admissions and 526 deaths, and in 1866, 2,961 admissions

and 202 deaths. The total admissions for twenty-nine months, according to his report, was 7,128, a majority of whom belonged to the laboring classes. The number of males was 5,860, females 1,268; deaths 853, or 11.9 per cent.

Riess (*Berlin Klin. Wochenschrift*) states that during the prevalence of typhus exanthema in Berlin, during the spring of 1868, he observed two cases of recurrent fever in the Charité, which evidently had been introduced from easterly regions, from whence also typhus fever spread. Hirschberg describes in the same medical journal cases seen in Posen.

Pastau and Lebert also give detailed reports of the fever as seen at Breslau. Pastau states that there were 55 cases in the hospitals, the majority being from fifteen to twenty-five years, and belonging to the laboring classes. Some of the patients were strong, while others were weak and badly nourished. The majority of them came from a part of the city where damp and dirty dwelling-houses predominated, and where several years past typhus fever raged. A few cases were introduced from without. Pastau and Lebert both found enlargement and tenderness of the liver frequent; diarrhœa in one-half the cases, icterus seldom. In one of Lebert's cases symptoms of acute Bright's disease manifested themselves; in two cases parotitis with suppuration was observed.

Relapsing fever also appeared in Northern China and Tartary. In the *Records of Military Medicine* for February, 1866, page 142 (Paris), Dr. Moréche gives an account of the very extensive prevalence of relapsing fever in Pekin and throughout Northern China. This report shows that early in 1864 this fever was making extensive ravages in Northern China and in the provinces further west towards the Russian possessions. He shows that its prevalence in Tien-Tsien was troublesome alike to Chinese and Europeans and the French Sisters of Charity.

Dr. Azéme, a surgeon under the French authorities at the Island of Reunion, has published (*La Union Médicale*) an account of a severe and long-continued prevalence of relapsing fever upon that island for the first time, and extending from November, 1864, to the date of his last report in 1867. The history of this epidemic, officially recorded by Dr. Azéme, has a special value in the natural history of relapsing fever. Upon the little Island of Reunion, with its plantations culti-

vated by Hindoo coolies, this intelligent French physician, in his distant and completely isolated field of medical duty, has carefully recorded this series of events that, from the very circumstance of separation and distance, helped to demonstrate the whole problem of transportability of the cause of this fever in a very conclusive manner. There has always been a practical difficulty in tracing the progress of the fever from one city to another, and from one country to another, in such a manner as to *prove* the proposition of transportation of the contagion in a satisfactory manner, with proper proofs of dates, persons, and groups of persons. We may add that Dr. Azéme's report is confirmed by several independent witnesses who have written subsequently.

The Island of Reunion is occupied by sugar planters, who employ Hindoo coolies under contracts for two or three years' service and return home again. The coolie transport, *Eastern Empire*, took 450 on board at Calcutta, for the port of St. Denis, Isle of Reunion. November 14 the ship came to anchor at the latter place, and having a number of cases of relapsing fever on board, the health authorities kept the entire company in quarantine until December 28; then permitted the disembarkation at St. Denis.

Soon the fact was discovered that this colony of coolies had become centres and carriers of the new fever. Both the starting points and the course of radiation of the disease were traced. Two of the medical men who were treating and studying it took the fever and died. It continued to prevail for more than two years, and when the two years' service of the coolies (per *Eastern Empire*) had expired, the survivors, when returning to Calcutta on shipboard, had several cases of relapsing fever among them.

In Europe we find the fever slowly spreading westward. It was epidemic in the province of East Prussia, lying on the north of Poland, in the latter part of 1867; in Berlin in 1868, and in Silesia in April, 1868 (Murchison). Soon after this date the fever again appeared in Great Britain. From the report of the medical officer of the Privy Council (1869), we learn that the last epidemic of relapsing fever in the United Kingdom ceased in 1855; and if any cases were observed between 1855 and 1868, a period of fourteen years, they were very few and scattered. At the London Fever Hospital, out of about thirty thousand patients, mostly of the poorer class, admitted between

those years, not a single instance of the disease was seen. The first well-marked case in the recent epidemic was admitted to the Fever Hospital on the 4th of July, 1868. The patient was a young Irishwoman, aged 20, who had resided eight years in London, and was received from Easington's Buildings, Whitechapel, with marked symptoms of this fever. July 6th, a whole family was admitted under suspicions, from 8 Inkhouse Court, and on the 8th a Polish woman, aged 32, was admitted from the same house. July 30, another case was admitted from 9 Inkhouse Court, and on the 1st of September the London German Hospital began to receive relapsing fever patients from the neighborhood of Whitechapel, whence the previous cases had been sent to the London Fever Hospital. With the record of these hospital cases in 1868, numbering only 10 or 12, all records and evidence of the presence of this fever in London ceased until May, 1869, when its appearance was again announced, not only in Whitechapel, but in various other German and Polish quarters of the metropolis, and from that date up to the 1st of October, 70 cases of that fever were admitted into the fever hospital; more than one-half were from Bethnal Green and Whitechapel. Notwithstanding the assemblage of cases in these two chief centres of the fever, it appeared that 68 of the 70 cases had been admitted from no less than 19 of the 36 parishes of the metropolis. Plainly the disease had become widely diffused, and soon it was demonstrated that "tramping vagrants had largely assisted in the distribution of the complaint over London." The extent of the epidemic, when fully developed, may be gathered from the following statement of Dr. Murchison (Lond. *Lancet*, Jan. 22, 1870), in December, 1869: "The disease has spread so rapidly that the resources of this vast metropolis are now being taxed to their utmost to find accommodation for persons attacked with it."

The fever appeared in several towns of Britain during the fall and winter of 1869-70. In Liverpool the first cases were seen in September, 1869, but it was not fully recognized until May, 1870, when it had already spread widely among the poor (*Lancet, San. Commission*). In Manchester 20 cases were reported in November 1869, several being paupers from London. In Edinburgh the first cases were recognized in January, 1870 (Muirhead, *Ed. Med. Journal*).

During the year 1870 the epidemic prevailed in London, and many

of the large towns of England and Scotland, to an alarming extent. Liverpool, the chief port of emigration to this country, suffered severely throughout the entire year, and during the first quarter of 1871.

HISTORY OF RELAPSING FEVER IN THE UNITED STATES.

The recorded history of relapsing fever in the United States, previously to 1869, is very brief. It seems to have been first recognized in 1844 by Professor Meredith Clymer of this city, who was at that time a resident of Philadelphia. He thus describes the fever which he then saw (*New York Med. Jour.*, March, 1870):

In June, 1844, a Liverpool packet with Irish emigrants arrived at Philadelphia. There had been some sickness on board during the voyage, and fifteen of the steerage passengers were immediately sent to the Philadelphia Hospital, and put in the wards in my charge. They were ill with a form of continued fever unlike any that I was then familiar with. I thought that I recognized (by the descriptions I had read of it) a variety of fever which had prevailed in Scotland and parts of England, during that and the previous year (1843-44). The event proved the correctness of my conjecture. In all these cases the access was sudden, with severe headache, vomiting, occasional epistaxis, muscular and joint pains, rapid pulse, high body-heat, tongue coated with a thick, creamy-gray or yellow fur, with red edges and tip (in some cases, for several days quite dry, as was the mucous membrane of the mouth), enlarged spleen, no special intestinal symptoms, and no eruption. In all there were great debility, and a peculiar bronzed hue of the face, more or less like that of persons suffering from chronic malarial toxæmia. About the seventh day the febrile symptoms suddenly subsided, with copious sweatings; the appetite became good, the expression of countenance natural, but much muscular weakness persisted, and the color of the face was of a dull straw chloro-anæmic tint. In every case about the fourteenth day a relapse happened, which in some had all the severity of the initial paroxysm, whilst in others it was slight. So far as I know, there was no second relapse; all were discharged from hospital during their second convalescence, at their own request, though many still quite feeble. It was perhaps for this reason that I saw none of the sequlæ, reported so common after the disorder in Great Britain, as ophthalmia, with amaurotic symptoms, boils, swellings of the legs and ankles, pain in the feet without swelling, paralysis of the deltoid and other muscles. The disease did not extend to the nurses or other inmates of the hospital, though the fever patients were not segregated. Two sisters, however, who had been residents of the city for several years, but whose brother had come out in the same ship and been taken ill at their house a few days after his arrival, were admitted into the wards with well-marked attacks of the fever. Several other passengers were at this time in the hospital, complaining of slight chills and sweatings, headache, nausea and vomiting, with

loss of strength, but got well without any other decided symptoms of the disease. Several cases of illness from the same ship were sent to the Pennsylvania Hospital, and were under the care of the late Professor W. Pepper, who at first was disposed to regard them as mild typhus, but he subsequently admitted their resemblance to the British epidemic.

In a very interesting paper on "*A severe form of Inflammation of the Eye, following Typhus fever, as it appeared in the City of New York in* 1847–48," by Dr. A. Dubois (*Transactions American Medical Association*, Vol. I., p. 373), the writer reviews the history of a "peculiar inflammatory disease of the eye following fever" (Wallace), called by Mackenzie "ophthalmia post februm," or "ophthalmitis post febrilis," of which Dr. Dubois witnessed and treated, at the New York Eye Infirmary, 29 cases from September, 1847, to May, 1848. During this period, typhus and relapsing fevers were very prevalent in Ireland, Scotland, and England, as well as on the Continent in Upper Silesia. There was at that time a large emigration of the poorer classes from these countries to the United States, and typhus or ship fever prevailed to an unusual extent at this and other ports among the emigrants. Dr. Dubois was led to believe, from his examination of the history of this peculiar inflammation of the eyes, that it was a sequela of the same fever described by Mackenzie and other writers of Great Britain and Ireland. He accordingly applied to Dr. Swett, Physician to the New York Hospital, for a description of the prevailing fever. The following is Dr. Swett's statement:

"The epidemic differs in many respects from those which have prevailed in former years. In many cases the fever was ushered in very suddenly by a chill, pain in the head, back, and limbs, and great prostration; these were followed by febrile reaction, vomiting, and loss of appetite. An abundant rose-colored rash appeared over the body early in the disease. It occurred in patches, irregular in size and shape, and disappearing on pressure. This rash, so striking and characteristic, appeared abundantly on the trunk, sometimes on the limbs, but was never seen on the face. In some cases, livid, petechial spots were noticed, but they were rare. Sudamina were seldom seen. The condition of the tongue, of the brain, and nervous system, did not materially differ from that noticed in the fever of former years, except that

the prostration was more rapid and marked in many cases. Diarrhœa, unattended with pain, tympanitis or other abdominal symptoms, was of frequent occurrence. It was readily checked by opium. The duration of the disease was usually from two to three weeks, according to the severity of the attack, convalesence usually setting in and advancing rapidly. Relapses were by no means unfrequent—the cause generally escaped detection. In some cases the convalescence has progressed regularly for a week, or even two weeks, when all the symptoms of the fever returned, even to the eruptions over the body. The disease was much more contagious than in former epidemics. No constant lesion is observed after death; many cases, when carefully examined, presenting no traces of any organic disease. Occasionally the glands of Peyer have been found affected, and generally they have been noticed as being more distinct than usual, without, however, being properly diseased—sometimes inflammatory complications were found to exist. In the autumn, ulceration of the lungs, intestines, with symptoms of dysentery, were noticed. In the early part of winter, peritonitis was not unfrequent, and during the spring, pleurisy. Bronchitis was very common, and inflammation of the fauces, tending to œdema of the glottis, was occasionally met with."

This description of Dr. Swett accords with those given by writers on mixed epidemics of typhus and relapsing fever, previously to the period of the full recognition of the latter. Dr. Dubois remarks: "It will be observed that there are several strong points of resemblance between the several epidemics, though occurring at different times, and in places widely separated, viz.: The suddenness of the attack; the energy with which the disease was developed; its comparatively short duration; great liability to relapse; its contagiousness, and the fact that no special morbid lesions were discerned after death." The following are the reports of the cases in Dr. Dubois' paper, so far as relates to the fever:

1.—"*Mary Gall*, aged 13 years, admitted as an out-door patient October 13, 1847, landed at Quarantine on the 1st of June; many of her fellow passengers were sick with fever on the voyage. About the middle of June she was taken ill of the same disease; was confined to her bed for twelve days; relapsed after two days. Second attack continued for ten days; after one week had a second relapse, which lasted for two weeks."

2.—"*Edward McCormick*, aged 29, admitted January 28, 1848. Came from the country in the early part of August; soon contracted fever; was ill between five and six weeks, without any remission."

3.—"*Margaret Orpen*, aged 25, taken with fever on the 25th of December; was confined to her bed for a fortnight; in three days had a relapse; was ill for three or four days."

4.—"*Margaret Gilfeather*, aged 11 years, admitted March 6, 1848; had fever in July, which was followed by relapse."

5.—"*Ann Quanan*, aged 18, admitted March 8, 1848; had fever in August; did not entirely recover her health till the latter part of October."

6.—"*James Wilson*, aged 35, admitted March 22, 1848; was taken ill with fever January 14; convalescent in one week; four days after had a relapse; was troubled with nausea during the last attack."

7.—"*Stephen Stanley*, aged 26, admitted March 31, 1848; was ill of fever at the Quarantine in November; confined to his bed for ten days; after a convalescence of four days had a relapse; in five weeks from the first attack was perfectly well."

8.—"*William Brady*, aged 17, admitted March 31, 1848; had fever on his voyage from Liverpool in December last; ill for ten days; no relapse."

In a critical review of these cases, Professor Clark concludes that four could hardly have been anything else than relapsing fever. He states that he "saw well-marked instances of relapse in typhus" during that epidemic. In regard to this form of ophthalmia, Murchison says: "One of the most remarkable features of relapsing fever is the frequent occurrence, during convalescence, of a peculiar disease of the eyes. This sequela has been observed in almost all epidemics, but is never met with after typhus or pythogenic fever." If this opinion were correct it would be conclusive as to the character of the fever in the whole twenty-nine cases observed by Dr. Dubois. But this statement of Murchison is not, we believe, sustained by writers on ophthalmic medicine.

It is probable that relapsing fever was present in the epidemic of 1847–8, in this city, but, as in British towns, the proportion of typhus cases largely predominated, especially in the later months of its prevalence, and it was at no time epidemic.

In 1850–1, Professor Flint, while engaged in the study of continued fever in the Buffalo Hospital of the Sisters of Charity, made records of fifteen cases which, on subsequent analysis, he identified as relapsing fever. These cases all occurred among recent Irish emigrants (*Prac. of Med.*, 1866). From this period to 1869 we have no records of relapsing fever.

RELAPSING FEVER IN NEW YORK IN 1869-70.

During the latter months of 1869 anomalous cases of fever were reported by the Inspectors of the Board of Health, especially in the lower wards of the city. They were regarded and reported as forms of typhus, typhoid, and remittent fevers. As the Inspectors did not have an opportunity to follow cases through their several stages, owing to the fact that the sick were for the most part charity cases, and were immediately sent to hospital, the opportunity did not offer to make continuous observations of any individual case. In the Dispensaries of the city cases were observed in December, but they were regarded and treated as remittent fever. Several cases also entered Bellevue Hospital in November, December, and January. Its true character was satisfactorily determined in this hospital in January, and it was made the subject of careful study.

The history of the fever, from its origin in the city to the date of its recognition, is somewhat obscure, but sufficient was learned by personal inquiry at the homes of those who had suffered from it to make a more or less connected series of events attending its early history.

The first cases that were definitely and satisfactorily traced out occurred on the 6th of October, 1869, at Nos. 11 and 13 Mulberry street. The building is an old rookery, having a liquor store in the basement, and dilapidated rooms in the garret. It fronts on the Five Points, and is one block from Chatham street. It was occupied by three families which received vagrant lodgers of the most degraded class—all being drunkards and beggars. Thirteen persons were found to have had the fever in the house, and numerous sick lodgers had strayed to other lodgings, and in two or more such houses the fever had appeared. Two lodging-cellars in the same block were reported to have had the same sickness among their vagrant lodgers and inmates in the month of October, but it could not be satisfactorily proved that the people of Nos. 11 and 13 had contracted the fever from that source.

At the time that the fever was fully identified cases were traced to Nos. 33 and 37 Mulberry street. These tenements received lodgers of the vagrant class, some of whom were sick, and had been known to

have lodged at Nos. 11 and 13 Mulberry street, and at other places in that block, where fever is known to have prevailed at a still later period. Fourteen persons are known to have suffered from relapsing fever in these two buildings, confined to three small rooms, during the months of November and December.

Cases were also found to have occurred in November and December at Nos. 7, 21, 49, and 53 Baxter street, which are occupied by the poorest class of tenants, and where vagrant lodgers congregate. Several of these sick people had been sent to hospital.

The following groups of cases were found to have occurred later in December and in the first week of January, viz., at Nos. 20, 51, 53, 57, 59, 67, 73, 79, 109, 104, and 106 Cherry street. These tenements are all lodging houses of the lowest class. The occupants are of the roving, houseless kind, who lodge in any out-of-the-way place where night overtakes them. The lodgers at Nos. 20, 73, and 79 are known to have interchanged visits and lodgers with the tenements in Mulberry street where the fever first prevailed, but it could not be positively proved that the fever was transmitted from the latter to the former, though it is highly probable that such was the fact. The total number of cases which were traced to these dwellings or found in them, was forty.

The several places above mentioned were the chief centres of contagion at the time of the recognition of the fever. They were in full operation in the last week of December, 1869. There is good reason to believe that all of these foci originated from a low cellar lodging-place near the corner of Baxter and Chatham streets, but the most careful and patient inquiry could not establish the fact, as they became scattered after recovery from their relapses, and medical attendants were not aware of the nature of the fever, and hence not specially interested in observing and recording its phenomena.

In January cases of fever were found at 79 James street. The first case occurred in a lodger who came from 59 Cherry street, in the last week of December, 1869. Three persons were sent from this group to the hospital. The fever also appeared later in the same month at Nos. 14, 18, 116, and 145 Baxter street. These places were all accustomed to receive vagrant lodgers. It was also discovered at Nos. 332 Water street, 337 First avenue, and in the forecastle of the steamboat Bridgeport. A careful examination of these latter cases proved very conclu-

sively that the steamboat employés contracted the fever at No. 59 Cherry street. One of the steamboat hands lodged at No. 332 Water street, and communicated the fever to the family. On the night of his relapse the sailor lodged with the family of his sister, at No. 337 First avenue, and after the usual period of incubation, fever appeared in this family, and five persons suffered.

In January and the early part of February the fever was found in a rear court at No. 59 Mulberry street. Upwards of thirty cases occurred in six tenements in this court, nearly all the families and lodgers suffering attacks. It first appeared in a family in which seven persons were attacked in succession, in groups of two or three each. The first two persons attacked had been exposed to the fever late in December. Sick lodgers from No. 59 Mulberry street visited and lodged at Nos. 284, 279, and 281 Mott street, and in time these places became fever nests.

The tenements and localities above mentioned seem to have been the most important among the first discovered centres of contagion of relapsing fever in New York. These places were the resort of vagrant lodgers, and were permanently occupied by the poorest and most degraded classes of the tenement-house population. In various other localities lodgers sick with the fever were found previous to the middle of February.

The earliest recorded case at Bellevue Hospital was admitted November 14, 1869. From that date to February 16, 1870, one hundred and three cases were entered on the hospital records, twelve of which occurred in the hospital. Cases continued to find their way to the hospital until the total number received was 238. Cases were admitted to Charity Hospital about the date of their admission to Bellevue Hospital.

In January, the fever began to spread in Bellevue Hospital; two physicians, several nurses, and patients, who were in immediate contact with the sick, were attacked. This circumstance led the Commissioners of Public Charities to remove all the sick to the Fever Hospital on Blackwell's Island, and forbid the admission of more cases to Bellevue Hospital. The Fever Hospital was soon overcrowded, and the Commissioners of Public Charities were compelled to provide additional hospital accommodations. They accordingly opened a Relapsing Fever Hospital on Hart's Island, February 26, and provided it with the necessary supplies, physicians, and nurses. To this hospital all the

fever cases were removed, both from the public institutions and from the city. This hospital remained open until August 8, 1870. The following final report of the Resident Medical Officer, Dr. Geo. H. Bosley, to the Commissioners, on closing the hospital, shows the working of that institution during the period above mentioned.

About the middle of February last your honorable body determined, owing to the great prevalence of relapsing fever in our city, to open a hospital for its special treatment, and on February 21, 1870, commenced to fit up the Barracks on south end of Hart's Island, which, during the war, were occupied with United States troops. February 24, one pavilion was completed, and on the 26th (two days later) the first instalment of patients was admitted. From this time until the middle of March following, the work of refitting, furnishing, etc., progressed in common with the daily arrival of patients (one day, March 15, admitting 103) from the other hospitals of the department and from the city.

The condition of the buildings, from the necessary haste with which they were completed, was none of the best, and this, with the fact that nearly all of the cold and bad weather of the past winter came in March and April, accounts for the large number of complications of the fever which at that time existed, and to some extent for the increased mortality. * * * * * * * * *

Owing to the class of people amongst whom this fever chiefly rages, the dieting of the patients has been in excess of that in other similar institutions, experience having shown that convalescence is greatly accelerated by a generous and wholesome diet; to this fact, together with entire personal cleanliness, strictly required from all, and the *pure air*, here so abundant, I attribute our total *small proportion of deaths* (6.87 per cent.).

The fever itself, occupying a period of nearly four (4) weeks for its course, attacks all alike, the old as well as the infant at the breast. The youngest patient on our books was only two (2) weeks old when admitted, the *two oldest*, 87 years. Its contagious quality is shown conclusively by the fact that two (2) of the medical staff, seven (7) of the nurses and orderlies, besides many of the attendants attached to the institution, have been prostrated by it, proving fatal in three cases, viz., two nurses and one orderly.

The total number of patients admitted since opening (February 26) has been 1,676; deaths, 115.

Amongst the latter number is one death by suicide, by drowning, the patient being delirious at the time. Besides the usual cases of relapsing fever, we have received quite a number which on examination proved to be something else, and were accordingly transferred to the other hospitals of the department. Amongst the latter were three cases of small-pox. One received from the Penitentiary, B. I. (on order of Visiting Physician), and the other two (2) direct from the Examining Physician of Outdoor Poor Department.

In transmitting this my *final* report, I take pleasure in returning my sincere thanks to your honorable board for the encouragement and sympathy you have ever manifested

towards myself and the sick under my care, to which fact I can attribute any success I may have had in the proper management of the affairs of this hospital.

TABLE SHOWING ADMISSIONS, &C., TO RELAPSING FEVER HOSPITAL.

MONTH.	ADMISSIONS.						DISCHARGES.			DEATHS.					AGE AT DEATH.			REMAINING.		
	Males.	Females.	Natives.	Foreign.	Total.	Average daily Admissions.	Males.	Females.	Total.	Males.	Females.	Natives.	Foreign.	Total.	Rate per cent.	Oldest.	Youngest.	Average.	Males.	Females.	Total.
3 days in February..	4	41	19	26	45	15	....	....	....	....	....	....	....	....	....	....	.....	.....	4	41	45
March	482	116	176	422	598	19.29	180	40	220	22	2	5	19	24	....	60	19	36.58	284	115	399
April.....	184	116	96	204	300	10	298	104	402	22	11	8	25	33	....	72	2 weeks	41.27*	148	116	264
May.....	203	170	135	238	373	12.03	228	248	376	17	9	5	21	26	....	67	13	43.30	106	129	235
June.....	115	128	76	167	243	8.1	143	168	311	9	14	4	19	23	....	75	20	40.95	69	75	144
July	52	62	43	71	114	4.07	116	133	249	5	4	1	8	9	....	67	2	40.44	...	...	...
Total....	1,040	633	545	1,128	1,673	10.93	965	593	1,558	75	40	23	92	115	6.87	75	2 weeks	40.44*	...	...	...

* Omitting two infants.

Partial Report of Age of Patients on Admission.

No. under 1 year.	No. under 2 years.	No. between 2 and 5 years.	No. between 60 and 70 years.	No. between 70 and 80 years.	No. between 80 and 90 years.
7	6	43	41	8	2

The following table exhibits the hospital records of relapsing fever in New York in the year 1870:

	BELLEVUE HOSPITAL, BOTH IN WARDS AND FROM CITY.	CHARITY HOSPITAL, BLACKWELL'S ISLAND.	RELAPSING FEVER HOSPITAL, HART'S ISLAND.
Total No. treated.....	238	796	1693
No. transferred to Blackwell's Island..	81	All the institutions on Blackwell's and Randall's Islands sent their sick to Charity Hospital.	60
No. transferred to Hart's Island.....	117	469	This hospital received patients from Feb. 26 to Aug. 8, 1870.

The total number of cases of relapsing fever treated in these hospitals, under the Commissioners of Public Charities, during the year, was 2,040.

Many very destitute cases were found by the inspectors which required immediate care. In order to provide the necessary nursing and medical attendance for this class, a ward was opened by the Board of Health at Worth street, where the sick received such care as their necessities demanded. This "Refuge" proved to be of great service to many of the wretched, homeless, and half-starved poor of that section of the city, who, falling sick of fever, had neither care, food, nor shelter. In many instances several members of the same family were admitted. From February 16 to April 26, 88 patients were received and temporarily provided for in this building. When the sick were in a proper condition for removal they were sent to hospital, but few having been retained throughout their entire sickness.

The progress of the fever during the year appears in the following table:

Quarter ending	April 2, 1869	721
"	July 2, 1869	873
"	October 1, 1869	894
"	January 1, 1871	133
"	April 1, 1871	60

The epidemic reached its culminating point in the second quarter of 1870, and from this point it gradually and quite rapidly declined. The following tabular statement of the weekly returns of cases shows the progress of the epidemic:

TABLE OF RELAPSING FEVER, SHOWING NUMBER OF CASES BY WEEKS, FROM JANUARY 1, 1870, TO APRIL 1, 1871.

Week ending	NO. OF CASES.	Week ending	NO. OF CASES.
January 8, 1870	19	August 27, 1870	44
" 15, "	13	September 3, "	35
" 22, "	9	" 10, "	33
" 29, "	22	" 17, "	22
February 5, "	54	" 24, "	15
" 12, "	58	October 1, "	20
" 19, "	56	" 8, "	16
" 26, "	59	" 15, "	15
March 5, "	58	" 22, "	9
" 12, "	56	" 29, "	20
" 19, "	48	November 5, "	18
" 26, "	94	" 12, "	10
April 2, "	100	" 19, "	8
" 9, "	57	" 26, "	5
" 16, "	80	December 3, "	7
" 23, "	64	" 10, "	7
" 30, "	66	" 17, "	4
May 7, "	61	" 24, "	5
" 14, "	90	" 31, "	4
" 21, "	79	January 7, 1871	9
" 28, "	84	" 14, "	4
June 4, "	54	" 21, "	19
" 11, "	49	" 28, "	3
" 18, "	55	February 4, "	1
" 25, "	68	" 11, "	3
July 2, "	57	" 18, "	1
" 9, "	42	" 25, "	1
" 16, "	36	March 4, "	2
" 23, "	30	" 11, "	7
" 30, "	22	" 18, "	7
August 6, "	35	" 25, "	1
" 13, "	21	April 1, "	2
" 20, "	39		

RELAPSING FEVER IN OTHER CITIES.

Philadelphia.—Nearly simultaneously with the appearance of relapsing fever in New York it seems to have been recognized in Philadelphia. The first case identified in New York occurred on the 8th of October, 1869, while the first recorded case in Philadelphia occurred, according to Dr. Parry, on the 8th of September, 1869 (*Am. Jour. Med. Sci.*, Oct., 1870, p. 337). Its origin in Philadelphia, as in New

York, is unknown. "The district in which it was first met," says this writer, "was in the eastern portion of the town, the square between Second and Third and Arch and Race streets. The block is divided into four nearly equal parts, by Bread street, running north from Arch to Race, and Quarry street, running east from Second to Third street. Connected with these were several very dark, narrow, ill-ventilated alleys, all the houses of which were crowded to overflowing with a poor Irish and German population, the former predominating. At the time the fever appeared Bread and Quarry streets were both in a deplorable condition, having received for an indefinite period much of the garbage thrown out by their careless inhabitants." The first case occurred in a woman "living in a very narrow court, running back from Quarry street, west of Bread. She was one of a family of seven persons who lived in a house having three rooms, each about twelve feet long and eleven feet wide, and with very low ceilings. These were upon separate stories, the second and third being occupied as bedrooms. In the upper of these four persons slept, the patient in question, a grown up sister and two brothers, aged about ten and twelve respectively. The whole family appeared to be well fed, and, with a single exception, were rather more than ordinarily fleshy. From personal inspection we know that during their illness the table was always plentifully supplied with the necessaries of life. The house was moderately clean, and the family well clothed."

The fever seems to have prevailed in a mild form during the winter, but was not brought to the knowledge of the Board of Health (Report of 1870, p. 30) until the latter part of April. Dr. Goodman, Port Physician, says: "The first notification of sickness of a contagious nature, received by the Board of Health, and referred to me for investigation and report, was in a letter received April 26, without date, signed by a citizen, calling attention to a destitute colored man and woman at No. 11 Cross alley, north of St. Mary street. These cases I reported as remittent fever in a typhoid state, and recommended them to be sent to the Alms-house; they proved to be relapsing fever." On the following day, April 27, Dr. Goodman found ten cases of fever in the cellars and alleys surrounding the Bedford street mission, and six other cases had been sent to the Alms-house. On visiting the Alms-house he learned from the attending physician that up to April 27

there had been 160 cases of relapsing fever received into its wards, and of this number 90 were then under treatment.

From this date the fever seems to have assumed an epidemic character, and continued to prevail in that form until about the 1st of August, when it began to decline. The locality where it became epidemic, and was most severe, is thus described by Dr. Goodman: "The most pestilential fever nests were located in the centre of this space, on Alaska street, and the various courts and alleys opening on this street, between Sixth and Eighth streets, which locality is principally occupied by our most degraded population and a resort of vagrants, tramps, and the debauched of the city" (*Report of the Board of Health*, Phila., 1870, p. 27). The extent to which the fever prevailed is thus given by Dr. Goodman: "I estimate that no less than five thousand cases occurred in Philadelphia during the year ending September 1, 1870, with two hundred deaths."

Cases of relapsing fever were also reported in Washington, D.C., Havre-de-Grace, Md.; Hackettstown, Woodbridge, and Keyport, N. J.; Morrisania and Jamaica, N. Y.; New Canaan, Ct., and at other places. But in the six towns last mentioned the fever occurred among laborers, who were all traceable to New York, and it existed only as small isolated groups.

Clinical Observations.—Relapsing fever, as seen and studied abroad, has been described by many writers in the form of a summary of its chief peculiarities. Dr. Murchison, one of the most eminent authorities on fever, embodies its symptoms in the following statement (*Lancet*, January 22, 1870):

He remarks: "The prominent symptoms of relapsing fever are, pyrexia, setting in suddenly with rigors, or chilliness; great frequency of pulse, and heat of skin, but no specific eruption; severe headache and general pains, but mind usually clear; pain, tenderness, and enlargement of the liver and spleen; rapid breathing; vomiting, more or less, and frequently slight jaundice and constipation. An abrupt cessation of these symptoms about the fifth or seventh day, with copious perspiration, but after a complete apyretic interval, during which the pulse may be unusually slow, and the patient may have a good appetite, and be up and walking about, an abrupt relapse on or about the fourteenth day from the first commencement, or sometimes later, running a

similar course to that of the first attack, but terminating on or about the third or fourth day of the relapse. The disease is very rarely fatal, except in persons whose constitutions are weakened by previous illness."

The characteristics of relapsing fever, as witnessed in London, are thus given in the Report of the Medical Officer of the Privy Council (1869). This very full and yet concise description is the more valuable as it is given by an eminent sanitarian:

"A contagious fever, rarely appearing except as an epidemic; frequently associated with epidemic typhus; even more than typhus, the fever of the vagrant and unemployed; liable to occur at any age, and more than once in the same individual; marked by very sudden invasion, rigors, headache, heat of skin, prostration, generally vomiting; pulse and temperature almost at their highest on the first day of illness; rapidity of pulse not being (as in typhus) the measure of danger. These symptoms are generally accompanied by more or less yellowness of skin, and by severe pains over the body, resembling those of rheumatism, and preventing the patient from sleeping. The tongue is usually moist, and throughout there is no pathognomonic eruption on the skin. After lasting from five to seven days, all symptoms abruptly cease, generally along with some critical evacuation, either profuse perspiration (the most common), or nose bleeding, or diarrhœa; apparent convalescence lasts for a week, the patient feeling well and hungry, his fever gone, and his pulse being often slower than in health. On or about the fourteenth day from the commencement of the original attack, sudden relapse takes place--a second paroxysm of fever, in all points similar to the first, or differing in severity only. The duration of the stage of relapse is commonly three days; and, though second or even several relapses sometimes occur, the patient usually enters upon steady convalescence before the end of the third week. The mortality of the disease is low, rarely exceeding five per cent. of the attacks. The prognosis appears to be more grave in drunken than sober people, and in persons over the age of 30 than in younger people. Of complications and sequelæ, the chief are lung congestions and inflammations; swelling about the joints, apparently from effusion into them; a peculiar form of ophthalmia; severe diarrhœa. In some epidemics, parotid buboes have been frequent. Pregnant women usually miscarry and the fœtus dies."

The clinical history of the fever as it appeared in New York, was carefully studied and recorded in Bellevue Hospital, by Professors Clark, Flint, and Loomis. The following detailed cases, taken from the clinical records of those physicians, with their notes and comments, enable us to compare the fever as seen here with it as seen abroad, and also to appreciate its chief peculiarities. These cases were originally published in connection with clinical lectures by the above-named professors in the *Medical Record* for March 1 and 15, 1870, and of the *New York Medical Journal* for March, 1870.

CASE I.—FIRST STAGE, FIVE DAYS; SECOND STAGE, TEN DAYS; THIRD STAGE, THREE DAYS.

Henry Gordon, aged seventeen, a native of this country, by occupation a laborer, was admitted December 17, 1869. He came from No. 37 Mulberry street, and he stated that several persons in the house in which he lived had been ill with the same kind of fever. He had been exposed to many hardships, inclusive, probably, of a want of proper food.

He was well up to four days before his admission, when he was seized with a chill, followed by fever and pain in the limbs. He had no epistaxis, nor diarrhœa. He suffered much from headache. On his admission the pulse was 110. He then complained of severe muscular pains. The bowels were constipated. The skin was hot, but moist. There was no eruption; there was no jaundice.

December 18, the day after his admission, he was free from fever. The pulse and temperature were normal. There was profuse perspiration on this date.

He continued free from fever from the 18th to the 28th, that is, ten days. The last four of these ten days he was sitting up. He continued, however, to complain of muscular pains, and he was quite weak.

On the 28th of December, after getting up, at 7 A.M., he felt chilly sensations, and soon returned to bed. The pulse was now 100, and the temperature in the axilla was 100°. At evening the pulse was 110, and the temperature 101°. On the 29th, the pulse was 120 at A.M., and the temperature at 102°. He had epistaxis for a few moments on this date, and diarrhœa. The fever persisted without any abatement for the two following days, the pulse being 120, and the temperature 102°. On January 1, at 9 A.M., the pulse fell to 90, and the temperature to 100°. He was then perspiring profusely. At 6 P.M., the pulse and temperature were normal. Free perspiration continued. The muscular pains had continued to be, and were still, severe.

The relapse of fever thus ended after a continuance of five days. After January 1, there was no return of fever. On the 13th of January he was able to sit up. He convalesced without any drawback, and was discharged, quite well, January 24. There was no eruption of any kind. The diarrhœa continued only two days, and was slight.

(The points in this case to which your attention is to be directed are, the abruptness of the attack; the continuance of high febrile movement for five days; the sudden and complete disappearance of fever, profuse perspiration occurring at the same time; an

apyrexial period of ten days; an abrupt relapse of fever lasting five days, the second febrile career ending suddenly, with profuse perspiration, and convalescence then taking place; the prominence of muscular pains, both during the fever and in the intermission; the residence of the patient in a house where this fever existed; his suffering from deprivations before being attacked; and, finally, the absence in the history of the characters which distinguish severally typhus, typhoid, and remittent fever.—PROF. FLINT.)

CASE II.—DISTINCT CHILLS WITH ATTACK AND RELAPSE, LASTING TEN AND FIFTEEN MINUTES; SEVERE MUSCULAR PAINS; FIRST STAGE, FOUR DAYS; SECOND STAGE, TEN DAYS AND A HALF; RELAPSE ON FOURTEENTH DAY; THIRD STAGE, FOUR DAYS.

Hiram S., æt. 24, single, merchant, South Carolina, entered December 28, 1869. During the night of 25th December was taken with a chill, lasting ten minutes, followed by fever, severe headache, and thirst; no remission up to time of entering hospital. On admission temp. 102½°; pulse 120; skin hot and dry; tongue dry and coated. Ordered liq. ammon. acetat.

Dec. 29th. High fever; pain in right iliac fossa.

Dec. 30th. Last night had a profuse sweat, and this morning every symptom of fever has disappeared. Pulse is 80; temp. 97½°. Complains of pain in the head, back, and calves of legs.

Patient has a gonorrhœa, and now treatment commenced for it. Pulse and temperature normal from Jan. 1st to Jan. 8th.

Jan. 9th. Early this morning patient had a chill, lasting fifteen minutes, followed by fever, headache, etc.

Jan. 11th. Pulse 130; temp. 102½°; commenced vomiting. Great pain in back and head.

Jan. 12th. Still high fever. Temp. 104°; pulse 132.

Jan. 13th. Skin moist. Temp. seems normal to hand. Patient does not move a limb, owing to severe muscular pains.

Discharged Jan. 24th, still debilitated. Pulse and temp. normal during last week.

CASE III.—TEMPERATURE 108¼°* ON THIRD DAY OF RELAPSE; FIRST STAGE, SIX DAYS; SECOND STAGE, EIGHT DAYS; RELAPSE ON FOURTEENTH DAY; THIRD STAGE, FOUR DAYS.

James C., æt. 15, single, New York, admitted December 26, 1869. Patient has been much exposed to the weather for four weeks, and has been sleeping on a damp floor

* NOTE BY PROF. CLARK.—Niemeyer (Prac., vol. ii., p. 570, Am. ed.) quotes from Wunderlich, who made the thermometer an instrument of prognosis, the following statements relating to typhus and typhoid fevers:—"In typhus, all the patients in whom the temperature reached 108° died; and of fourteen that died, five, or more than one third, had this high temperature. Of the patients whose temperature never rose above 105.5°, not one died." Referring to typhoid fever, he says (p. 589):—"We may look for the approach of death if the temperature remain for some time at 107°; if it suddenly rise to 107.5°, or 108°, or if it suddenly fall very low, say to 94°." This case shows that in relapsing fever the temperature may rise to 108¼°; and another in this series, that it may stand for two or three days at 107° in persons who are to recover, and who do recover as rapidly and perfectly as those in whom it at no time, either in the first or third stage, exceeded 102¼°.

In this series we have no instance in which the temperature fell as low as 94°; but there is one in which, after defervescence, it stood for one or two days at 96¼°, without any unfavorable influence.

during this time. States that he fell sick four days ago, with headache, pains in his limbs, loss of appetite and fever. On admission face is flushed, eyes suffused, tongue furred. Pulse 132, and temp. 105°. Bowels have not moved since he became sick. No cardiac or pulmonary disorder. Ordered a cathartic and one drop tr. aconiti rad. hourly. Evening, pulse 132; temp. 105°.

Dec. 27th. Pulse 132; temp. 104°. Same in evening.

Dec. 28th. Defervescence, with sweating. Pulse 100; temp. 96°. Evening, pulse 92; temp. 96°.

Dec. 29th. Pulse 88; temp. 99°. Evening, pulse 88; temp. 98°.

Dec. 30th. Eats well, and wishes to get up.

Jan. 4th. Relapse. Chilly feelings; severe headache, etc.; went to bed again; bowels open.

Jan. 6th, P.M. Pulse 136; temp. 103½°. Face flushed; urine 1016; alkaline. No albumen.

Jan. 7th. Pulse 148; temp. 104½°. Skin dry; pain in legs and feet; gurgling and tenderness in right iliac fossa; no eruption. Evening, pulse 144; temp. 105½°. Tr. aconit. rad., gtts. iij., repeated in two hours.

Jan. 8th. Pulse 96; temp. 96°. Sweating profusely. Evening, temp. 98°.

Jan. 9th. Pulse 84; temp. 99. Feels well.

Jan. 19th. Pulse and temp. normal since last report.

CASE IV.—FIRST STAGE, SIX DAYS; SECOND STAGE, SEVEN DAYS; RELAPSE, THREE DAYS; EPISTAXIS.

Margaret ——, widow, aged 24, born in England, occupation housekeeper, attacked November 3d.

Nov. 4th. Vomiting, nose-bleed, and high fever.

Nov. 6th. Admitted into hospital.

Nov. 6th, 7th, and 8th. Fever continued; temperature steady, at 104°.

Nov. 9th (sixth day). Sweating profusely. Temp. 97½°.

The remission lasted seven days. On the evening of November 15th the temperature was still 97½°.

Nov. 16th (thirteenth day). Headache and chilly feelings, and the temperature rapidly rose to 104°; on the 17th it reached 106½°.

Nov. 18th. Evening. Feels well, but temperature 105½°.

Nov. 19th. The usual sweat, and temp. normal. This is the beginning of convalescence.

(Thus we have the first attack lasting six days, the remission seven days, and the relapse three. The highest temperature was 106½°, and here we notice among the symptoms bleeding from the nose—PROF. CLARK.)

CASE V.—DIARRHŒA FIRST DAY; EPISTAXIS ON SIXTH DAY AND CRISIS; RELAPSE ON FIFTEENTH DAY.

Mary R., æt. 18, single, domestic, admitted Nov. 15th, attacked Nov. 10th with the chill and fever. On the first day there was *diarrhœa*. On the 16th (sixth day) there was epistaxis and tenderness in the right iliac fossa, and on that day the highest temperature (105°), and on the 18th epistaxis again, although the usual crisis had occurred in the night preceding.

Nov. 25th (fifteenth day). Relapse, and temp. 107°.

Nov. 27th. Epistaxis again; temp. still 107°; and pain in the back, legs, and shoulders.

Nov. 30th. Sweating and rapid subsidence of fever. Duration: the first fever between seven and eight days; of the intermission, a little over seven days; and of the relapse, five days. There is recurring epistaxis, diarrhœa at the onset, and on the sixth day tenderness in iliac fossa. Highest temperature 107°.

CASE VI.—FIRST STAGE, THREE DAYS; ERUPTION; RELAPSE ON TWELFTH DAY; THIRD STAGE, FOUR DAYS.

Mary W., æt. 35, widow, born in England, was attacked Nov. 20th, and admitted on the same day. The fever subsided after three days. At that time the menses, which had been suppressed for six months, appeared; and an eruption was noticed on the abdomen—purple spots, which disappeared on pressure. The relapse occurred (Nov. 31st) on the twelfth day, and the second critical sweat (Dec. 3d) at the end of four days. The highest temperature (105°) was reached the day before the second crisis.

CASE VII.—FIRST STAGE, NINE DAYS; REMISSION, EIGHT DAYS; RELAPSE ON EIGHTEENTH DAY.

Mary S., æt. 32, single, born in Germany, domestic in a poor family, attacked Nov. 24th, admitted Dec. 1st. Temperature on admission 105°. On the eighth day of the fever the menses appeared. Fever subsided on the ninth day with sweat. Remission lasted eight days; relapse on the eighteenth day (Dec. 12th), then five days of fever, terminating in a sweat Dec. 17th. There is probably a mistake of two or three days in the date of the attack in this case. The patient was not intelligent. The highest temperature was reached on the third day of the relapse, 106°.

CASE VIII.—FIRST STAGE, FIVE DAYS; RELAPSE ON FIFTEENTH DAY.

Henry G., æt. 17, born in this country, attacked Dec. 13th, admitted Dec. 17th. The usual symptoms, including chill and pain in the limbs; sweat and defervescence after five days (December 18th); relapse on the fifteenth day (Dec. 28th) after *ten days* of remission; on the second day of the relapse epistaxis and diarrhœa; two days later the highest temperature (102°) in the evening; the next morning fever had subsided, diarrhœa had ceased, patient sweating freely, temperature 98°.

CASE IX.—INTENSE HEADACHE; SUDAMINA; REMISSION, EIGHT DAYS; RELAPSE ON FIFTEENTH DAY.

Mary W., æt. 35, single, domestic, attacked December 14th, admitted Dec. 20th. This fever was attended with intense headache. The temperature was 105½° on the day of admission. The next morning it had fallen to 97° during a profuse sweat. Now there were *sudamina*, and there was tenderness in the right iliac fossa; remission lasted eight days, and relapse occurred on the fifteenth day (December 29th); the second fever lasted seven days, subsiding with the usual crisis Dec. 5th. Highest temperature 106°, on the first day of the relapse.

CASE X.—BILIOUS VOMITING; JAUNDICE IN RELAPSE; FIRST FEVER, FIVE DAYS; INTERMISSION, FIVE DAYS; RELAPSE ON ELEVENTH DAY, LASTING THREE DAYS; HIGHEST TEMPERATURE 103½° ON FIRST DAY OF RELAPSE.

Mary F., æt. 30, born in Ireland, domestic, entered Dec. 27th. Attacked on 25th with chilly sensations, pain in the back and lower extremities, and headache. At night there was high fever and bilious vomiting.

On December 27th, 28th, and 29th the temperature was 103°. Vomited occasionally.

Dec. 30th. Temp. 97°; appetite returns, and skin covered with perspiration.

Jan. 4th. Well and up to-day, when she had a chill; headache; tongue now dry and brown, and temp. 103½°.

Jan. 6th. Has become jaundiced.

Jan. 7th. Morning, temp. 103°. Night, temp. 98°. Sweating. Is still slightly jaundiced.

Jan. 15th. Pulse and temperature normal all last week.

CASE XI.—ABORTION; FIRST FEVER, THREE DAYS; INTERMISSION, EIGHT DAYS; RELAPSE ON ELEVENTH DAY, LASTING THREE DAYS AND A HALF; HIGHEST TEMPERATURE, 105°, ON THIRD DAY OF RELAPSE.

Mary F., æt. 15, single, domestic, entered in November to await confinement. Dec. 29th, seized with chills, muscular pains, nausea, vomiting and debility. High fever on the 29th and 30th, and on December 31st she miscarried. On Jan. 1st, temp. 104°, but commenced sweating, and in the evening the fever disappeared.

Jan. 9th. Another chill; vomiting; high fever.

Jan. 11th. Pulse was 130, and temp. 105°.

Jan. 12th. Evening, sweating again.

Jan. 13th. Temp. 97½°; debility; muscular rheumatism.

CASE XII.—FIRST STAGE, FOUR DAYS; SECOND STAGE, NINE DAYS; RELAPSE ON FIFTEENTH DAY; THIRD STAGE, THREE DAYS; HIGHEST TEMPERATURE, 106°, ON THIRD DAY OF RELAPSE.

Emily R., æt. 27, married, born in England, domestic, admitted Dec. 29th. Attacked on 26th. Pain in limbs; chill of one hour's duration, followed by fever and headache.

Dec. 31st. Highest temp. in first attack 104½°.

Jan. 1st. Perspiring; temp. 97°.

Jan. 10th. Relapse, chill, followed by fever.

Jan. 12th. Evening, highest temp. 106°.

Jan. 13th. Profuse sweat, which commenced yesterday evening. Temp. 97½°. Has rheumatic pains all over body.

CASE XIII.—DIARRHŒA; SEVERE PAINS; FIRST STAGE, FOUR DAYS AND A HALF; SECOND STAGE, NINE AND A HALF DAYS; RELAPSE ON THE FIFTEENTH DAY; THIRD STAGE, FOUR DAYS; HIGHEST TEMPERATURE ON THIRD DAY OF RELAPSE, 106°.

Rosanna P., æt. 35, born in Ireland, widow, admitted Dec. 31st.

Dec. 28th. Chills and fever with sweating. On admission, abdominal pain, hot skin, intense headache, diarrhœa, and pain in calves of legs. Critical sweat on night of Jan. 2d. Relapse Jan. 12th, chills, aches, and pains, muscular articular, and cephalic; nausea and vomiting; temp. 104½°.

Jan. 15th. Diarrhœa; highest temp. 105°; sweating.

Jan. 16th. Temp. 96°, but pains continue.

CASE XIV.—FALSE CRISIS ON THIRD DAY; FIRST STAGE (INTERRUPTION INCLUDED), FIVE DAYS; PULSE FELL AFTER TRUE CRISIS TO 54, TEMPERATURE TO 95½°; HIGHEST TEMPERATURE 105° ON THIRD DAY; DISEASE TAKEN IN THE HOSPITAL, PROBABLY; NO RELAPSE AFTER FIFTH DAY.

Ann C., æt. 37, Ireland, domestic, admitted Jan. 3d. Patient complained only of weakness and dull pains in calves of legs on admission. Temperature and pulse were normal, and she was supposed to be a malingerer.

Jan. 12th. Had a sharp chill, followed by high fever and vomiting of bilious matter. Pulse 120; temperature 103°.

Jan. 14th. Pulse 112; temperature 104½°; sweating.

Jan. 15th. Pulse 86; temperature 97°. In evening, fever again; pulse, 108; temperature 105°; vomiting a great deal; headache; rheumatic pains.

Jan. 17th. Profuse perspiration; pulse 90; temperature 95½°.

Jan. 18th. Pulse 80; temperature 95½°.

Jan. 19th. Pulse 54; temperature 97°.

Jan. 24th. Pulse and temperature have been normal since last entry. Bowels now regular. Yesterday sat up all day; still complains of pain in left shoulder.

No eruption, epistaxis, or jaundice in this case.

Jan. 29th. Up to date pulse and temperature normal. Still has pains in left arm and shoulder; appearance of limb normal; patient improved rapidly, and was discharged Feb. 17th.

(It will be seen that in this case there was no relapse on or near the fourteenth day; that on the evening of the third day there was sweating, and the next morning an intermission, pulse at 86, and temperature 97°, lasting less than a day, and that the fever

finally subsided with another sweat at the end of five days. The case was kept under observation for a month after the fever ceased. I have seen no notice of such behavior in the European cases.—PROF. CLARK.)

CASE XV.—CRITICAL SWEAT VERY COPIOUS; FIRST STAGE, FIVE DAYS; INTERMISSION, FOUR DAYS; RELAPSE ON THE TENTH DAY, IF PATIENT'S STATEMENT IS TRUE; THIRD STAGE, FIVE DAYS AND A HALF; HIGHEST TEMPERATURE, 105½°, ON FIFTH DAY OF RELAPSE.

Thos. King, æt. 27, single, Ireland, laborer, admitted Jan. 8th.

Dec. 3d. Chilly feelings followed by burning fever, dry cough, thirst, and headache. These symptoms continued for five days, when he had such a perspiration as to wet bed-clothing through. After this felt well until two days before admission, when he had another chill followed by the usual symptoms of the relapse.

Jan. 11th. Reached highest temperature, 105½°.

Jan. 12th. Temperature 98°. Had sweat last night; fever gone.

CASE XVI.—FIRST STAGE SEVEN DAYS; SECOND STAGE, SIX DAYS; RELAPSE ON THE FOURTEENTH DAY, LASTING THREE DAYS.

Chas. Smith, æt. 37, native, boatman, admitted Jan. 13, 1870. Patient states that on December 30th he was attacked with chilly sensations, nausea, slight vomiting, headache, pains in the legs; fever followed, lasting about one week, when he had a profuse sweat, and the fever, nausea, and all signs of disease disappeared, except the muscular pains.

Yesterday, Jan. 12th, had chills and nausea again, and fever reappeared.

Jan. 13th. Pulse 136; temperature 104°.

Jan. 14th. Pulse 136; temperature 104°, both morning and evening.

Jan. 15th. Perspiring freely. Pulse 100; temperature 96°. Evening, pulse 60; temperature 97½°. Skin natural. Muscular pains still continue.

CASE XVII.—ON THE EVENING OF THE FIFTH DAY THE FEVER EXISTED IN FULL FORCE; THE PULSE AND TEMPERATURE AT THEIR MAXIMUM, 130 AND 103°; ON THE MORNING OF THE SIXTH DAY THE PULSE 80 AND TEMPERATURE 97°, PROFUSE PERSPIRATION; ELEVEN AND A HALF DAYS FROM THE COMMENCEMENT OF THE FIRST ATTACK PULSE 136, AND TEMPERATURE 103½°; FEVER THREE DAYS; STAGE FIVE DAYS; CEASES ALMOST SUDDENLY WITH PERSPIRATION, NOT TO RECUR AGAIN. (PROF. CLARK.)

Mary Fagan, æt. 30; Ireland; domestic. Admitted to Bellevue Hospital Dec. 27, 1869. Patient is a prisoner from the work-house, doing service in the hospital. On the morning of Dec. 25th she began to have chilly sensations, headache, and muscular pains in back and lower extremities. A half hour afterwards she became hot, commenced to vomit bilious matters, and the headache became so severe that she had to go to bed.

On Dec. 26th was seen by the physician in office. Her pulse was 130; temp. 103°; tongue coated, moist; skin moist. She had severe headache, nausea, and vomiting. Was ordered an emetic; afterwards, spts. mindereri.

Dec. 27th. Admitted as a hospital patient. Vomiting has ceased; skin dry. Evening, pulse 126; temp. 103°.

Dec. 28th. Vomiting again; skin moist; pulse 120; temp. 103°. Complains of headache and muscular pains. Ordered ice, to be swallowed, and a blister to epigastrium. Evening, bowels have moved; pulse and temp. same as morning.

Dec. 29th. Morning, pulse 120; temp. 103'. Evening, pulse 130; temp. 103°; skin moist; tongue coated and moist; no vomiting.

Dec. 30th. A marked change has occurred; pulse is 80; temp. 97°; skin covered with a profuse sweat; face pale; is very weak. Complains of soreness all over the body; bowels open; has some appetite. This is the first remission since fever began.

Dec. 31st. Pulse and temp. normal. Has great pain in back.

Jan. 4th. Up to this morning patient has been very well. Pulse and temp. have been normal, and she has been walking about. Has been taking quinine, 2 grs. three times a day, since the 31st ult. To-day she began to have some chilly sensations again, and a return of the feeling of soreness. Evening, pulse 136; temp. 103½°; tongue dry and brown.

Jan. 5th. Pulse 130; temp. 103°; skin is moist. Complains of severe headache. Evening, no change.

Jan. 6th. Is slightly jaundiced; face decidedly yellow; pulse 130, and temp. 103° again.

Jan. 7th. Pulse 125; temp. 102½° at 10 A.M. 7 P.M. Free from fever; skin covered with profuse perspiration; tongue is coated; is much prostrated; skin and conjunctiva still keep their yellow hue.

Jan. 13th. Since 7th she has been entirely free from fever. Appetite is much better, but she is still very weak. Rheumatic pains did not leave her till yesterday. Skin has cleared up; bowels are regular.

CASE XIX.—DISEASE CONTRACTED IN THE HOSPITAL; VAGINAL HEMORRHAGE; FIRST STAGE, SEVEN DAYS; RETURN TO DUTY; RELAPSE ON FOURTEENTH DAY.

Kate ——, night nurse in Bellevue Hospital, and doing duty in the ward where case — lay.

Nov. 22d. Sharp chill; succeeded by slight fever; chilliness for twenty-four hours; pains and aches; severe headache.

Nov. 24th. Nausea, vomiting, high fever, mild sweats; irregular.

Nov. 25th. Fever continues; hemorrhage from vulva; not the time for the menstrual flow.

Nov. 26th. Profuse perspiration; chilliness and fever alternate; a little delirious.

Nov. 29th. Fever suddenly subsided, leaving patient very weak; hemorrhage from vulva ceased to-day; very weak.

Dec. 6th. Had returned to duty. To-day chills and all the former symptoms, including flow of blood, reappeared.

Dec. 10*th.* Fever again suddenly disappeared; profuse perspiration. Treatment during first attack, large doses of quinine; during relapse, hydrochloric acid and small doses of quinine, vi. grs. daily.

CASE XX.—FIRST STAGE, DOUBTFUL; SECOND STAGE, SIX DAYS; NO PAINS OF JOINTS.

Rose M——, æt. 35; married; Ireland; domestic. Admitted to Ward 21, Dec. 23d, four days ago; chills, fever, headache, etc. Attack was subsiding when she entered the hospital.

Jan. 1*st.* Relapse began; fever continued unabated; temp. ranging from 104° to 106° until Jan. 6th, when, after a profuse perspiration, temp. was 97°; pulse 72; did not complain of articular symptoms. Treatment, hydrochloric acid and quinine in small doses from the date of admission.

Jan. 18*th.* Discharged.

The following clinical observations made by the physicians at Bellevue Hospital upon the preceding and other cases are important in the study of the disease:

Period of Incubation.—The facts bearing upon the period of incubation are very meagre. Professor Clark says: "Relative to the period of incubation, one single fact is all we have so far that bears upon it. A woman was received at the hospital whose brother came home sick with the fever and slept one night in the house, and nine days after this sister and a little child were attacked. He slept, however, with four children, and neither one of them took it, while a child who was not in the bed with him did take it. Dr. Harris, in a note to me, says he has found a case in which he can trace the period of incubation, and it appears to have been eleven days. In still another it appears to have been fifteen days. It may not be constant, but it is not likely to be below nine days, and that is about the period of incubation of typhus; and though this disease has only alliances with that, we should not be surprised to find the period of incubation the same."

Professor Loomis states that the patient, M. R., her brother and her mother were admitted upon the same day, the mother suffering from erysipelas of the leg; the brother had been ill for two or three weeks with a fever, and upon admission was exceedingly weak, but it was not ascertained that he had a complete intermission with relapse. During his stay in the hospital, Frank C., also a patient, was much about his bed. On November 27 Frank was seized with chills, quickly followed by a sharp fever, lasting four days; was delirious. On the morning of

the fifth day he began to sweat profusely; his pulse dropped suddenly to 68, temperature to 94°. He convalesced slowly; complained of rheumatic pains; he is still in the ward, but has had no relapse. In regard to the period of incubation in these cases, he remarks: "An interesting feature in the history of these cases is the duration of the interval between the arrival of the Rogers family and the occurrence of the disease in the two boys and the night-nurse. This interval in the latter case was seven days; in the former cases eight and twelve days. Supposing that they contracted the disease from these people, and on their arrival at the hospital, then the incubative period of the disease varied from seven to twelve days. While tolerably sure of the former fact, we are not so certain of the latter."

Invasion.—Professor Flint says: "Abruptness of invasion characterizes the disease. The attack is sudden. There is no prodromic period. The seizure is almost always marked by a well-pronounced chill, which is immediately followed by febrile movement. Usually, the patient at once takes to the bed; but, in some cases, one, two or three days pass before there is this evidence of yielding to the disease. Moderate perspiration occurs shortly after the fever begins, in a considerable proportion of cases. This was noted in seven of twelve cases which I formerly observed. It is noted in the histories of several of the cases recently under observation."

Professor Loomis says: "In all of these cases (thirty-five or thirty-six) the initial symptom was a chill, followed by the usual phenomena of the disease." He adds: "Its invasion is almost always sudden, and is marked by chills or rigors, frontal headache, pain in back and limbs, lassitude, and a giddiness which compels the patient to take his bed. The chill lasts from one-fourth of an hour to several hours, and is followed by a hot skin, increased headache, and severe arthritic pains; thirst intense; tongue white; appetite lost; nausea and vomiting frequent, accompanied by pain in epigastrium; the matter vomited consists of ingesta, frequently tinged with bile; sometimes it resembles black vomit. The mind is usually clear; in some instances there is violent delirium. The temperature rises to 104° or 108°; the pulse early runs over 100 to 120, 140, 160, not usually higher on the second than on the first day. The symptoms at night are aggravated. Occa-

sionally the heat of skin is relieved by irregular sweatings, but the other symptoms suffer no abatement. As the disease progresses the patient becomes more prostrate; pulse more rapid and tense; tongue more thickly coated, and sometimes brown and dry. Temperature may rise to 109°. There is no characteristic eruption, although a rose rash is often present for a few hours, or a day or two. The skin is frequently jaundiced from slight to deep yellow; the liver sometimes, the spleen more frequently is enlarged."

Professor Clark calls attention to cases which had not marked chill at the commencement of the attack. He says: "It will be remarked that the chill as an initiatory symptom was not present, or rather was not recorded in two cases, and in several it was no more than a chilly sensation; in one it occurred in alternation with heat, and in another with sweats; repeatedly it was a 'sharp chill,' and in one it lasted an hour."

It may be added that the medical officers of the Board of Health found large numbers of sick who, in the first stage of the attack, were yet able and disposed to travel about from house to house.

First Stage.—Of the symptoms during the first stage Prof. Flint remarks: "The fever attains quickly to either considerable or great intensity, as denoted by the pulse and axillary temperature. Thus, of two cases in which the disease was developed in the hospital, in one the pulse on the first day was 120, and the temperature 103°; in the other case the pulse on the first day was 130, and the temperature was 103°. During the continuance of the first paroxysm, the pulse and temperature generally denote a persistent intensity of fever, the pulse ranging, in different cases, from 100 to 140, and the temperature from 100° to 105°. The oscillations are rarely great, and those which occur are irregular in their occurrence."

In the following table Prof. Clark gives the different stages of the fever in a number of cases:

LENGTH OF THE SEVERAL STAGES OF THE FEVER.

	Duration of first Period.	Duration of Intermission.	Duration of Relapse.
Margaret C.	7	7	3½
Mary R.	7½	7	5
Mary W.	3	7	4
Catharine, night nurse.	4 or 5	8	?
Mary S., according to patient	10	8	5
Mary W.	8	8	7
Rose M.	5	8	6
Rika B.	6	4 ?	4
Hiram S.	6	7	4
Emily R.	6	9	5
Rosanna P.	5	9	4 or 5
Thomas K.	5	4	6

Prof. Loomis states that "the duration of the primary fever has a margin in the twelve cases of four to ten days; that of the interval, of seven to fourteen days; that of the relapse, of two to seven days."

Prof. Flint says: "The duration of the primary paroxysm is stated to be, in the majority of cases, from five to seven days. Exceptionally, it may be only two days, and it may be twelve days. In the cases which I formerly observed, the average duration was nine days, the maximum being twelve and the minimum six days. Of ten cases, among those recently observed, in which the duration was definitely determined, the minimum was four days, the maximum eight days, and the average duration was a fraction under six days."

Prof. Clark says: "In almost all fevers there is a daily remission. In miasmatic fevers, except the congestive, it occurs in the afternoon or night; in typhus and typhoid we usually notice it in the morning. But in this affection, thus far, the fever is strictly continuous till the crisis occurs, giving generally the same rapidity of pulse and the same temperature of the body evening and morning; or when there are variations, they arise from the even progress or rapid decline of the disease, and are not repeated the next day."

Defervescence or Crisis.—Prof. Flint remarks: "The cessation of the fever is as abrupt as the accession. The pulse and temperature quickly fall to nearly or quite the normal standard. The transition from high fever to complete apyrexia takes place, often, in a few hours; usually this is accompanied by profuse perspiration, which continues for several hours, and even an entire day. Not infrequently, the pulse and temperature fall below the standard of health. In two of the cases recently under observation, the pulse fell to 54, and in one case the temperature to 95°. In a day or two both the pulse and temperature rise again to the normal standard."

Prof. Loomis says: "At the end of a week, sometimes as early as the third day or fifth day, a marked remission occurs, a copious sweat breaks out, and almost immediately the whole phenomena of fever suddenly vanish, leaving the patient unexpectedly free from the painful symptoms with which he had before been harassed. The pulse comes down in a few hours from 140 to 70 or less; the temperature from 107° to 98°. Sometimes, instead of a profuse sweat marking the remission, there is an alarming epistaxis—diarrhœa, menorrhagia, or hemorrhage from the bowels. The patient now feels perfectly well except that he is weak; his appetite returns, his pulse ranges from 50 to 70 per minute, and he gradually gains strength."

Second Stage.—The length of this stage varies from four to eight days, as appears from Professor Clark's table, above given. Professor Flint thus speaks of this stage: "During the apyrexial period or intermission, the absence of fever is complete. It is incorrect to call this period a remission; the fever does not remit, but it intermits. The average duration of this period is stated to be about seven days; but it may not exceed two or three days, and it may extend to twelve days, or even more. In the cases which I formerly observed, the average duration was five days, the longest being eight, and the shortest three days. Of the cases recently observed, the minimum duration of this period was five days, and the maximum, nine days. The mean duration was a fraction over six days."

Professor Loomis says: "This apparent convalescence is, however, of not long duration; for, after a week, generally on the twelfth or twentieth day of the disease, without warning, a sudden relapse occurs, ac-

companied by the same phenomena as attended the primary fever; the pulse may rise in a few hours from 70 to 120 or 140. The symptoms of this stage of the disease are sometimes milder, sometimes more severe than at first."

Relapse.—The duration of the period of relapse is given in Professor Clark's table, above quoted, varying from three and a half days to seven. Professor Flint says: "The duration of the relapse is stated to vary between three and five days. It may, however, be only twenty-four hours, and it may extend to ten days. In the cases which I formerly observed, the minimum was two days and the maximum ten days. The mean duration was six days. Of the cases recently under observation, the duration of the relapse is noted in eleven. The shortest duration was three days, and the longest was eight days. The average was four and a half days."

Professor Flint thus describes the symptoms of relapse: "The relapse, like the primary attack, is sudden. It is generally ushered in by chilly sensations, but not so constantly by a well-pronounced chill as the first paroxysm. The fever in the relapse quickly becomes more or less intense. The intensity may exceed that of the first paroxysm. But, in a majority of cases, the intensity is less. The relapse also ends suddenly, and in most cases in profuse perspiration."

But this striking feature of the fever may not occur. Professor Clark says: "Relapse did not occur in the case of one of the two physicians who took the fever in the hospital, yet the fever had the duration, the crisis, and all of the distinctive characters of the first stage of relapsing fever. The same can be said of case fourteen, unless the singular intermission, commencing in sweat and ending in recurrence of fever, without chills, after sixteen hours, is to be regarded as separating the first and third stages."

Professor Flint also refers to one case in which no relapse was observed.

On the other hand, there may be more than one relapse, as was occasionally noticed by Health Inspectors.

Temperature and Pulse.—Professor Clark prepared the following table illustrating the highest temperature in a given number of cases:

HIGHEST TEMPERATURE IN TWELVE CASES OF RELAPSING FEVER.

FIRST FEVER.		RELAPSE.		Temperature at Defervescence.	
Temperature.	Day of the Disease.	Temperature.	Day of the Relapse.		
104°	3d, 4th, and 5th.	106½°	2d	95½°	for two days; 3d day 97.
103	4th	103½	3d	97½	
104½	5th	106	3d	97½	
104	7th	105½	5th	97½	
105½	7th	106	1st	97½	
105	8th	106	4th	96	
104½	?	105	3d	98	
105	6th	107	1st and 3d	97	
103	2d, 3d, and 4th	103½	1st	97	
104	3d	105	3d	97½	
103	4th	103½	1st	97	
105	5th, morning and evening.	108½	3d	96	

Remarking upon this table, he says: "You observe the period of highest temperature is not the same in all the cases. Notice also the temperature in the relapse. Here is a fact which has not been observed abroad—that the temperature rises higher in the relapse than in the primary attack. Here is another fact which has not been noted by our European brethren—the temperature in almost all instances falls below the natural standard in the defervescence. In one case it fell to 95½° and remained there two days. In all, except the tenth case of the table, it fell below the standard of health."

Professor Flint gives the following illustrations of the pulse and temperature. The patient was admitted to Bellevue Hospital on the fifth day of the disease.

DAY.	PULSE.	TEMPERATURE.	
Fifth day	105	102.5°	
Sixth day	104 A.M.	103.5° A.M.	
"	108 P.M.	103.5° P.M.	
Seventh day	90 A.M.	102.5° A.M.	
"	96 P.M.	101° P.M.	
Eighth day	88 A.M.	103° A.M.	Profuse perspiration.
"	114 P.M.	104° A.M.	
Ninth day	60 A.M.	96° A.M.	
"	68 P.M.	97° P.M.	
Tenth day	60 A.M.	98° A.M.	
"	54 P.M.	96° P.M.	
Eleventh day	56	98.5°	
Twelfth day	64	98°	
Thirteenth day	64	98.5°	
Fourteenth day	100 A.M.	105° A.M.	
"	105 P.M.	105° P.M.	
Fifteenth day	96	102°	
Sixteenth day	114	104°	Profuse perspiration.
Seventeenth day	66	91°	

In addition to the foregoing clinical observations upon the more important and characteristic symptoms of relapsing fever, the following interesting summary of other symptoms and complications observed in the cases treated at Bellevue Hospital was made by Dr. Moore, House Physician (*New York Medical Journal*, March, 1870, p. 128):

Total number of cases treated in hospital	103
Number of cases jaundiced	9
Number of cases with hepatic tenderness	18
Number of cases with splenic tenderness	11
Number of cases with epistaxis	21
Number of cases with nausea and vomiting	39
Number of cases with diarrhœa	11
Number of cases with eruption	5
Number of cases with delirium	4
Number of cases with bronchitis	6
Contracted fever in hospital	12

Had muscular pains in the calves of the legs, in the knee-joints, and upper extremities	103
Number of cases with pains in head and back	103
Number of cases fatal	2
Causes of death—suppression of urine	1
Causes of death—fever	1
Number of cases with convulsions (epileptiform)	1

Observations relating to treatment, pathological lesions, etc., are unimportant. Facts relating to sex and age of the sick, rate of mortality, etc., appear in the report and tables of Dr. Bosley, resident physician of the Relapsing Fever Hospital, page 470–1. It should be stated in this connection, that this hospital was situated about twelve miles from the city, and was reached by boat. The consequence was, that during the stormy weather of the winter and spring patients were more or less exposed in transit, and not a few of the deaths were due to diseases of the respiratory organs.

Turning from the clinical history of the fever, and the observations upon it by those who were most competent to study and illustrate its various phenomena, we have to consider relapsing fever as an epidemic, subject to sanitary management and control. The various questions which we have to consider, and which were, as far as practicable, made subjects of investigation, relate to the identity of the fever, its origin, its contagious character, the class of persons most liable to be affected, measures of prevention and control, etc., etc.

Is relapsing fever a distinct species of fever? It was not until the epidemic of 1843 that relapsing fever was distinguished from typhus. Prof. Henderson, of Edinburgh, in a paper "*On some of the Characters which distinguish the present epidemic fever from Typhus*" (*Edin. Med. and Surg. Jour.*, vol. 61), pointed out some of the more important differences between the two fevers, and laid the basis of that discrimination which has since been so accurately made by Dr. Jenner. As the question of identity or non-identity of typhus, typhoid, and relapsing fever is one of great sanitary importance, and as the subject has not as yet received much attention in this country, the following remarks of Prof. Flint upon this subject are of much practical value:

"In the first place, the laws of relapsing fever, as regards the primary paroxysm, the intermission and the relapse, or relapses, are very striking and peculiar. The clinical

history, in these respects, has but a remote analogy to the different types of intermittent fever, and to the very rare instances in which a relepse of either typhus or typhoid fever is observed. In respect of the distinctive points now referred to, relapsing fever differs essentially from any other form of fever; it stands alone. Moreover, as we have just seen, there are other distinctive points in its clinical history. That it is a distinct species of fever is a fair inference from the peculiarities pertaining to its phenomena and laws.

"In the second place, if it be not a distinct disease, it must be a variety of periodical, that is, malarial fever, or of either typhus or typhoid fever. Now, it may be clearly shown to lack certain characters which are essential to the fevers just named. To prove that it is not a form of periodical or malarial fever, it is sufficient to say that it has prevailed repeatedly in situations where the special cause of intermittent and remittent fever, that is, malaria, does not exist; that it is undoubtedly a contagious disease, and that it is not controlled by anti-periodic remedies. The proof involved in these facts is so conclusive that it is unnecessary to cite further evidence. That it is not a variety of typhoid fever is shown conclusively by the absence of the anatomical characteristics of the latter disease, the so-called typhoid lesions of the small intestine; and also by the absence of the essential features pertaining to the clinical history of typhoid fever. The grounds for the non-identity of relapsing fever and typhoid fever are certainly stronger than for the non-identity of typhoid and typhus fever. The essential points of difference, indeed, are more strongly marked than those which distinguish measles from scarlet fever—diseases which were once considered as identical.

"To establish the opinion that relapsing fever is a distinct disease, it is then only necessary to show that it is not a variety of typhus. It is certainly a distinct species of fever, if its non-identity with typhus be proven. The points of difference in the clinical history of relapsing fever and typhus are very marked. A relapse of typhus is exceeding rare; and, when it occurs, the duration of the primary career of fever exceeds the average duration of the first paroxysm of relapsing fever. On the other hand, the occurrence of a relapse in relapsing fever is the rule, the exceptions to which are as rare as is the occurrence of a relapse of typhus. The characteristic eruption which is nearly constant in typhus never occurs in relapsing fever. The physiognomy and the mental condition in the two diseases present wide points of difference. The fatality, which is considerable in typhus, is comparatively insignificant in relapsing fever. But the conclusive proof is that relapsing fever affords no protection against typhus. Patients who have passed through the former have repeatedly contracted, by contagion, the latter. Murchison cites an abundance of facts exemplifying the correctness of this statement. Hence it is wrong to transfer patients affected with relapsing fever to hospital wards containing cases of typhus. There are no facts showing that the contagion of typhus ever gives rise to relapsing fever. The conclusion is, that each of these two diseases has its own special poison or miasm, by means of which it alone is reproduced; that is, neither of these two diseases is capable of communicating the other. This fact is sufficient to establish the opinion of their non-identity. A fact which is distinctive of relapsing fever, as contrasted with typhus and typhoid fever, is that its having been once experienced does not afford exemption from subsequent attacks. It has been known to attack repeatedly the same person."

2. *Origin.*—The origin of relapsing fever in New York has not been, and probably cannot be, satisfactorily determined. So much time had elapsed from the occurrence of the first case to the period when the fever was definitely recognized, that it was found impossible, after the most careful and persistent inquiry, to trace the disease beyond certain localities. In these localities are found at all times the most vagrant, unsettled classes, and the largest number of destitute emigrants. But there was not at that time any unusual destitution, nor was typhus, which is a very constant accompaniment or precursor of relapsing fever, as prevalent as usual. However favorable the conditions were for the reception and propagation of the contagion of relapsing fever among the poor of New York, the evidences of its local origin are far from satisfactory. Its importation seems to us much more probable, and much more in consonance with the preceding history of the fever. The fever was at this time prevailing abroad, and in localities from which emigration to this country was constantly going on. It is stated that "in London the disease was thought to have been introduced by German immigrants. There is a tide of such persons going through Liverpool, on their way to America" (*Report on Relapsing Fever in Liverpool, Lancet*, November 12, 1870). Though it is not proved that the fever was introduced into London or Liverpool by these emigrants, it is a fact worthy of notice that the epidemic spread westward from Russia and Germany, along the great routes of emigration, and appeared at such periods at different points as would indicate transportation. Perhaps the most significant fact bearing upon the question of the origin of the epidemic in New York is the certainty of the previous importation of the disease into this country. The cases observed by Prof. Clymer, in Philadelphia, in 1844; by Dr. Dubois, in New York, in 1847–8, and by Prof. Flint, in Buffalo, in 1850–1, were in recently-arrived emigrants from localities where the disease was prevailing. The absence, therefore, of the special exciting causes of the epidemic in this city in the fall of 1869 and of the year 1870, and the very general prevalence of the fever at the great centres of emigration in Europe, lead to the belief that the contagion was imported. In alluding to this subject, Prof. Flint remarks: "The causation of relapsing fever is of importance with reference to the inquiry whether the disease is likely to prevail indefinitely in this city, and in

other parts of our country. Although its diffusion involves generally, and perhaps always, a contagious principle, the history of the disease in other countries shows that it occurs as an epidemic, and, after continuing for a certain time, it disappears completely. Thus, in the city of London, for the fourteen years preceding the winter of 1868–9, there had been no cases of the disease. The complete disappearance of the disease for so long a period goes to show the operation of predisposing and co-operating causes in conjunction with the special poison on which the production of the disease depends. In view of the past history of the disease, it is a fair conclusion that it will not become a permanent visitor on this side of the Atlantic. It will prevail in this city as long as auxiliary causes favor its diffusion. It will be likely to be carried to other places, especially to large towns where a considerable portion of the population are living under circumstances favorable to its occurrence; but it may be expected to disappear not long after it ceases to prevail as an epidemic."

Contagion.—The contagious nature of the fever was recognized by even the most casual observer. Group after group of cases were discovered to have originated by personal contact with the sick. A homeless wanderer, in the first, second, or third stage of the fever, would lodge in a crowded cellar or tenement-house, and create a new focus of fever every night. In this manner one person, "a tramp," having no home and lodging wherever night overtook him, would scatter the contagium far and wide, and establish many new fever nests. One man, arrested in his travels while in the midst of his fever, stated that the preceding night he lodged in New Jersey, this night he should sleep in a lodging-house, and that to-morrow night he hoped to stay in West Farms. In the case of Kane, who, on the night of his relapse, travelled two miles and slept with his sister's children, we have a striking example of the manner in which the poison was spread by contagion. The entire family took the fever from this man. (See account of this family on page 498.)

Although the fever was markedly contagious, yet it was apparent that the contagious principle was not very diffusible. Those persons only contracted the disease who were brought into personal contact with the sick, or who visited and remained some time in the confined air of the

sick-room. In the hospitals the nurses and physicians in immediate attendance upon the sick suffered attacks, and for a time it was found difficult to supply the relapsing fever hospital with the requisite attendance. It did not extend beyond the single room in a tenement house where it appeared, if the family remained isolated, and there was no personal communication with other apartments. Groups of families living in familiar intercourse were repeatedly found affected in the same tenement house, while other families occupying contiguous apartments, but having no personal contact with the sick, escaped. In the lowest haunts of prostitution, where a single case of fever occurred, the nightly succession of lodgers would contract the disease and convey it to other dens of infamy and destitution.

A careful study of the individual cases showed that they belonged to groups, and these groups were susceptible of very accurate description and isolation. This fact is illustrated by the following note made in February, 1870, by Dr. Harris, the Sanitary Superintendent. He states that "thirty-eight groups, or fever nests, included one hundred and ninety-three cases; of these one hundred and sixty-four cases have been thoroughly studied, and found to have been limited in origin to thirty-five tenements, which usually consisted of a single living room with a communicating bed-room. In only one instance was it found on two floors of the same house. Four of the groups were on the top floor, three on a middle floor, and all the others on the first floor, in the basement, or cellar—cellars greatly preponderating. With one exception all these thirty-eight groups have been traced to five, and apparently to three points of departure. One of the first groups will illustrate the history of the whole.

No. 59 Cherry street, cellar lodging-house. In the last week of December, sickness was reported there. Sanitary Inspector O. G. Smith, of that district, examined the patients, and expressed the opinion that it was typhus or typhoid, and recommended that all the sick be immediately removed to hospital. He ascertained that various lodgers from that cellar had entered hospital at different times during the preceding six weeks. The cellar was summarily evacuated, under official orders, January 3, all the sick being sent to hospital, and the family and lodgers catalogued and put under observation in their new home above ground. Now, this is the record: No less than nine persons had suffered from

relapsing fever in that cellar previous to January 1. These patients had bowel symptoms, and one at least had eruption which was pronounced petechial. At this cellar, No. 59, two children named Higgins, from 73 in the same block, and on the first floor, in comparatively well ventilated quarters, passed in and out and became sick early in January. Three cases occurred in one room at the latter tenement, and several others are believed to be traceable to the same place. Just before the Board of Health caused No. 59 to be evacuated, a mother and daughter named Casey transferred their lodging to 79 James street, where each of them in succession became sick and went to hospital; and a little more than one week after the daughter went, the keeper of the lodging-house, Mrs. Dunn, became sick. This cellar was summarily evacuated, and the inmates placed in new quarters above ground, and put under observation for further developments. At the cellar in 59 Cherry street, two seamen, named Powers and Harrison, were frequent visitors during the month of December. Powers became very sick and was sent from the forecastle directly to hospital; while the deck hand, Harrison, became so sick on the 26th of December that it was necessary to take him from his forecastle lodging, at the foot of Catharine street, and convey him to the Sailor's Boarding House, at 332 Water street, where he was laid in a close, dark lodging-room, with three other lodgers, all of whom became sick with the same fever in less than two weeks, this man being sent to hospital after two or three days.

Another seaman, by the name of Thomas Kane, from the same forecastle, and who was also a fellow lodger with the seaman Harrison on the 27th of December, at the lodging house above mentioned, had been sick with the fever from Christmas. This man, on the 7th of January, feeling unable to return to his duties on shipboard, visited his sister, Mrs. O'Brien, living on the top floor of the front house, No. 337 First avenue, near Twenty-first street, a distance of two miles. That night he became very sick, with a high fever; it was his first relapse. His sister's family consisted of her husband and herself, an infant at the breast, and four small children of various ages. The children lay down beside their sick uncle upon the floor, and slept under the same blanket that night. These children and the entire family have sickened successively in the following order: (1) The four children, who slept with their uncle on the night of the 7th of January, became sick

January 16th, the period of incubation in their cases being precisely nine days; (2) Mrs. O'Brien and her infant child; (3) Mr. O'Brien. All the persons of this group were sent to hospital as they were found sick. While this whole family had the fever in succession from exposure to the single lodger, who was at that period in the stage of relapse, no other persons in that house were attacked.

The communication of the disease by infected clothing was many times rendered probable, but in no instance was the evidence as conclusive as in the following instances related by Dr. Parry (*Am. Jour. Med. Sci.*, October, 1870). He gives the following examples in the practice of Dr. Watson of Philadelphia, of the apparent conveyance of the contagion by fomites: "The family lived in a healthy neighborhood and were in comfortable circumstances. One of the sons was employed in a neighboring manufactory when they procured a new hand, who, it was afterwards learned, had just come from the Philadelphia Hospital, where he had been ill with relapsing fever. From him M. purchased a pair of overalls and carried them home. On the 19th of April one of the sisters washed these, and she was taken ill with the fever on May 1, making the period of incubation twelve days. At the same time this garment was handled by two other sisters, who fell sick on the 2d and 3d of May respectively."

The second case was as follows: "A woman learned through the newspapers that her husband had been picked up in the streets and taken to the Philadelphia Hospital. He had not been at home for some time before. On the 21st or 22d of March she sent a friend to the institution to learn his condition. She found him dead, it was stated from relapsing fever. She went to the dead-room and identified his body, which was not brought away for burial. She carried his clothing to her own home and placed them in a room next to her children's bedroom, with an open door between them. Four cases of the disease afterwards occurred in the family. On April 7th a boy was taken, April 25th a girl, April 29th another girl, and on May 3d her husband. There had been no cases of the disease in the neighborhood before that time, so far as could be ascertained. There certainly had been none in that square."

In most instances the disease seems to have spread from the above tenements to the other dwellings.

The following table exhibits the date of occurrence, street and number, names of families, and total number of the earliest cases of relapsing fever in New York:

[*The figures attached to the names indicate relation to same group of cases.*]

DATE.	STREETS.	FAMILIES.	TOTAL NUMBER.
October 6	Nos. 11 and 13 Mulberry	(1) Folesten and McCreely	7
.....	Nos. 11 and 13 "	(1) Tierney and 1Sullivan	3
.....	No. 13 "	(1)Conlan	3
Dec. to Jan.	No. 37 "	(1) Conlan, 1Kelly, 1Gordon, 1Nivers, 1Holt, and 1Crane	6
"	No. 37 "	(1) Sullivan, 1Laville, and 1Irvin	3
.....	No. 33 "	(1)Stack	5
.....	No. 34 "	(1)Dwyer family	6
.....	No. 20 Cherry	Mahar	2
.....	No. 59 "	(1) Hurley and lodgers	10
February 8	Steamer Bridgeport	(1) Powers, 1Harris, and 1Kane	3
.....	No. 332 Water	(1) The Keeper and two lodgers	3
.....	No. 73 Cherry	(1) Higgins	1
January 2	No. 109 "	Hugh Hammill	1
" 4	No. 13 Stanton	(2) Hanson and wife	2
.....	No. 49 Baxter	(1) Cassidy, 1Cronan	5
January 3	No. 79 James	(1) Anna Casey	1
" 31	No. 79 "	(1)Casey and 1Dunn (Casey is consecutive with those of 59 Cherry street, January 8.)	2
" 30	No. 220 West Eighteenth	*Brennan (Hospital)	9
.....	No. 10 Jersey	(4) Long and Brown	7
.....	No. 281 Mulberry	Lad named Ogg	1
.....	No. 337 First avenue	(1) O'Brien from Kane	7
.....	No. 53 Baxter	(1) Scanlon and Watkins	3
January 27	No. 5 Batavia	(1) Stokes, a lodger	1
February 6	No. 14 Baxter	(5) Seymour	4
.....	No. 59 Mulberry	(1) The Foye Family	7
Dec. 27 and 29	Melrose, Westchester County	(3) George Smith (Castle Garden)	1
December 10	No. 645 East Twelfth	(2) Farrell and 5McRoe	7
January 8	No. 145 Baxter	(1) Susan White	1
.....	No. 116 "	(1) Five families	16
January 3	No. 73 New Chambers	(1) Sherman	4
February 3	No. 18 Baxter	(1) O'Rourke	6
" 4	No. 193 Mulberry	(3) Conroy	3
" 10	No. 134 Mott	Mrs. Lynch and Murphy	3
" 16	No. 83 Mulberry	(1) The Bishop family	5
" 15	No. 315 Water	?McDonald and Reardon	3
" 15	No. 6 Roosevelt	?Albert Fulz	1
" 20	No. 256 Mott	?Mrs. Southwick	1
" 11	No. 67 Cherry	(1) Mr. and Mrs. Cass	2
" 11	No. 149 Cedar	?Robert Durie	1
.....	No. 111 Mulberry	?Patrick Conroy	1
February 5	No. 60 James	(1) John Gallagher	1
" 19	No. 74 Grand	Charles Sheldon*	1
March 14	No. 520½ Broome	Thomas Handlin	1
February 28	No. 94 Park	William Ryan	

* Took the fever at the Fever Hospital.

The following propositions, discussed at length by Murchison, were repeatedly verified during the late epidemic:

(*a*) *When relapsing fever commences in a house or district, it often spreads with great rapidity.*

(*b*) *The prevalence of relapsing fever, in single houses or in limited districts, is in direct proportion to the degree of intercourse between the healthy and sick.*

(*c*) *Persons living in comfortable circumstances, and in localities where the disease is unknown, are attacked on visiting infected persons at a distance.*

(*d*) *Relapsing fever has often been imported by infected persons into localities before exempt.*

Class of people among whom the fever principally prevailed.—The prevailing opinion of writers on relapsing fever is that it is peculiarly a disease resulting from overcrowding and destitution, while typhus is a disease which finds its exciting cause in overcrowding alone. The severer forms of this epidemic have occurred during seasons of famine and among those who suffer the greatest want of food, and hence the name "famine fever," "die hungerpest," etc. This was the case in the epidemics of 1817 in Ireland, and of 1847 in Great Britain, Ireland, and Silesia, and several other outbreaks. An exception to this rule was the Scotch epidemic of 1843, which was not preceded by a failure of crops. Some recent observers have questioned the necessary dependence of relapsing fever upon destitution. Muirhead (*Edin. Med. Jour.*, July, 1870) states, of cases seen by him in 1870 in Edinburgh, that "in no single instance which came under my observation could starvation be said to be the immediate cause of the disease. Not one of those individuals could be said to be emaciated. In fact, they were all wonderfully clothed with fat." Dr. Parry, of Philadelphia (*op. cit.*), takes a similar view of the cases observed by him in 1869, and would reject the theory that destitution is the exciting cause of this form of contagious fever.

The experience of the medical officers of this Board during the recent epidemic, would seem to confirm the previous opinion as to the chief factor in the causation of relapsing fever, viz., destitution. The fever

clearly sought and found its victims, by preference, among that homeless class of people who wander about the city by day, eating the food which they beg from door to door, or pick up in the streets, and who crowd together at night in damp and filthy cellars, and unventilated apartments. This was a matter of daily observation by the medical officers. The fact that many well-fed families, living under favorable circumstances for health, suffered attacks of the fever on exposure, does not disprove the proposition. Physicians and nurses in attendance upon the sick took the fever and suffered severely, but the disease never showed the slightest tendency to prevail among the better classes. During the entire period of its prevalence in New York, eighteen months, the upper and middle classes of society enjoyed perfect immunity. It prevailed as an epidemic only among the vagrant and destitute.

Sanitary Measures.—On the first recognition of the presence of relapsing fever in New York by its medical officers, the Board of Health adopted stringent measures to control, and, as far as possible, suppress it. For the information of the medical officers of the Board and of public institutions, and to secure prompt action, the following memoranda were issued under the direction of Dr. Harris, Sanitary Superintendent:

"The 'relapsing fever' having begun to prevail in a few places within the Metropolitan District, the Board of Health has ordered that it shall be regarded as a contagious and infectious disease. It is a fever that can be controlled and prevented by sanitary measures; but in order to apply the necessary means for preventing its spread in overcrowded quarters, it is required that every person who is sick with it should be discovered and brought under sanitary care.

"Though contagious and infectious, and consequently requiring the entire separation of the sick from the well, this fever is so particularly a disease that can spread dangerously only by the aid of overcrowded, badly fed, and uncleanly people, that wherever the health of these classes of the poor is properly protected and the sick removed and well provided for, and their unclean and infected houses are purified, the fever will cease to spread.

"'1. The greatest personal predisposition to relapsing fever is given by states of poverty and privation; so much so that the disease is often known by the name of famine fever: where destitution has not existed, or has been adequately relieved, relapsing fever is not likely to be epidemic.

"'Relapsing fever is, in a very high degree, communicable from sick to healthy. The

more confined the atmosphere in which sick and healthy are together, the more certain is the disease to be communicated.

"'An attack of relapsing fever is greatly less dangerous to life than an attack of typhus. But when relapsing fever has attacked and when all its acute symptoms are past, the sufferers remain for a while extremely weak, requiring that food and restoratives should be liberally supplied them; in default of which the feebleness left by the disease may often be of indefinite duration.

"'Relapsing fever is a disease which cannot safely be treated in the houses of the poor; for in them, crowded and ill-ventilated as they generally are, and with inmates insufficiently nourished, there must be every likelihood that the infection will spread. It is essential that, under such circumstances, the sick should at once be removed from amid the healthy. Ample hospital accommodation is therefore an indispensable condition for limiting the extension of the disease.' (*Extract from Circular of Medical Officer of Privy Council, England.*)

"Medical officers of the Metropolitan Board of Health are required to make a thorough inspection of every inhabited cellar and of the entire tenement-house district under their care respectively, and as often as once in each week to make a searching tour for reinspection through those tenement-house regions where this fever is most liable to become prevalent. All uncleanly cellars, lodging houses, alleys, rear yards, and badly crowded or filthy tenements should be reported, in official form, upon the day the inspection is made: and forthwith, whatever the Board of Health and the Sanitary Superintendent can do to apply or execute the needed sanitary measures, will promptly be ordered and carried into effect.

"Every medical officer and every agent of the Board of Health on sanitary duty in any portion of the Metropolitan District, is hereby instructed to advise the poor and destitute classes of inhabitants, especially those in crowded and unclean tenements, wherever such people are found, to keep their apartments ventilated and to cleanse and whitewash all bedrooms, halls, and closets; and especially to direct them to give information to the Board of Health, without delay, whenever any person becomes sick in their tenements. And further, let every medical officer see to it that every case of this fever be removed to hospital during the day the case is reported from any lodging house, cellar, or tenement.

"Wherever this fever is found, or liable to be introduced, any family or persons that are poorly fed or have not some kind of good animal food daily, should be reported to the Commissioners of Public Charities, or to the Association for Improving the Condition of the Poor.

"This disease, correctly understood, cannot become a source of public alarm. Its habits and history are well known, and facts concerning its prevalence elsewhere, as well as what has thus far been seen of it in New York, warrant the belief that by the co-operation of medical practitioners with the Board of Health, and by vigilant and active sanitary measures, this new scourge of poverty and overcrowding may be restrained and soon driven from the Metropolitan District."

The special measures adopted were of two kinds, viz.: 1st, *The care of the person*, and 2d, *The care of the apartments.*

1. *The care of the Person.*—In all previous epidemics relapsing fever had been found to spread by contagion. The contagious principle, as has been noticed, though not intense and widely diffusible, was found to be active in the limits of the apartments of the sick, if those apartments were close and unventilated. If the sick slept with the well the latter was almost certain to contract the fever. When, however, the sick occupied large and well ventilated apartments, those entering or remaining in such rooms were liable to the disease only who were brought into close relations with the sick, as nurses and friends. This feature of the contagion of relapsing fever rendered it specially amenable to sanitary care. It required only that the sick should be scrupulously separated from such immediate contact with the well as brought the latter within the limits of infection to prevent the spread of the epidemic.

To accomplish this first and most desirable object of isolating the sick, the Board of Health added relapsing fever to the list of diseases declared contagious by ordinance, and required physicians to report every case at once upon having cognizance of it. As many cases are so mild that a physician is not consulted at all, especially among the most destitute class, the medical officers began a house-to-house inspection among the tenement houses, in order to secure control of those homeless wanderers who were least likely to come under the observation of physicians, and who were most liable to scatter widely the germs of fever. Measures were also taken to remove promptly to hospital all sick persons who could not be satisfactorily isolated, and treated at home. To render this work of removal as prompt and effective as possible, a temporary hospital was opened at No. 128 Worth street, to which those cases were removed that were discovered at night, or which required immediate care or could not bear transportation.

2. *Care of Apartments.*—Immediately upon the removal of the sick, the Disinfecting Corps entered the apartments and began the work of cleansing. This work was of the most thorough kind: clothing, beds, furniture, floors, walls, ceilings, passage-ways, etc., were subject to such treatment as was best adapted to remove filth and destroy any germs of disease. Carbolic acid solutions were applied to the woodwork and added to the lime for the ceilings and walls; and all apartment in

which there had been any fever patients were fumigated with sulphur. The alley-ways were cleansed, and all local collections of filth removed. The daily progress of this work, from February 7 to April 30, 1870, is exhibited in detail in the annexed statement, giving the number of apartments cleaned in each street:

Feb. 7.—Mulberry street, 4; Baxter street, 2; James street, 1; Donovan's alley, 1.
" 8.—Baxter street, 1; Grand street, 1; Park street, 1; Spring street, 3; West Houston street, 1; Mulberry street, 1.
" 9.—Madison street, 1; Catharine slip, 1; Mulberry street, 2; Steamer Bridgeport, 1.
" 10.—Pell street, 2; Cherry street, 1; Batavia street, 1; Mulberry street, 1; Baxter street, 1.
" 11.—Water street, 1; Rivington street, 1; Stanton street, 1; Mott street, 1; Baxter street, 1; Cherry street, 1; Oliver street, 1.
" 12.—East Twelfth street, 1; Mott street, 1; Monroe street, 1.
" 13.—Mott street, 1.
" 14.—James street, 1; Cherry street, 2; Mott street, 1; Baxter street, 1.
" 15.—Worth street, 1; Cherry street, 3; Baxter street, 1; James street, 1.
" 17.—Mott street, 2; Mulberry street, 5; Monroe street, 1; West Twelfth street, 1.
" 18.—Leonard street, 1; Mulberry street, 1; Baxter street, 1; Mott street, 1.
" 19.—Batavia street, 2; Oak street, 1; Cherry street, 1.
" 20.—Water street, 1.
" 21.—Water street, 1; Oak street, 2; Mott street, 1; Suffolk street, 1.
" 23.—Mulberry street, 1; Leonard street, 1; Elm street, 1; Worth street, 1.
" 23.—Laurens street, 1; Mulberry street, 2; Cedar street, 1; Baxter street, 1.
" 24.—Mulberry street, 1; Leonard street, 1.
" 25.—Baxter street, 1; Worth street, 1.
" 26.—Goerck street, 2; Cherry street, 1; Stanton street, 1; Worth street, 1.
" 28.—Mulberry street, 1; Baxter street, 1; James street, 1; Elm street, 1.
Mar. 1.—Mulberry street, 1.
" 3.—Cherry street, 1; Oliver street, 1.
" 4.—Roosevelt street, 2; Water street, 1; Worth street, 1.
" 5.—East Eleventh street, 1.
" 8.—New Chambers street, 1.
" 9.—Cherry street, 1; King street, 1.
" 10.—King street, 1.
" 11.—Rivington street, 1.
" 12.—Mulberry street, 1.
" 14.—Greenwich street, 1.
" 17.—Tenth avenue and Thirty-second street, 1; Mott street, 1.
" 18.—Mott street, 1
" 19.—Thames street, 1; Cherry street, 2.
" 22.—James street, 1.
" 23.—Mulberry street, 1.
" 24.—Washington street, 1.
" 25.—Mulberry street, 1.
" 28.—Baxter street, 2.
" 29.—Oliver street, 1.
" 30.—Baxter street, 1.

Mar. 31.—Madison street, 1; Washington street, 1.
April 5.—Elizabeth street, 1; Baxter street, 1.
" 6.—Baxter street, 3; East Twenty-fourth street, 1; West Houston street, 1; William street, 1.
" 7.—Mulberry street, 1; Mott street, 2; Roosevelt street, 1; Elizabeth street, 1
" 8.—Washington street, 1; Oak street, 1; Cherry street, 1; East Twenty-fourth street, 1; East Houston street, 1.
" 9.—Sheriff street, 1; West Thirty-second street, 1; Monroe street, 1; Hudson street, 9; West Fortieth street, 2.
" 11.—Corner Bowery and Hester street, 1; Frankfort street, 1; East Thirteenth street, 1; East Fourteenth street, 1; Baxter street, 1; West Eighteenth street, 1.
" 12.—Mulberry street, 1; Baxter street, 1; Spring street, 1; Cherry street, 1; Madison street, 2.
" 13.—Mott street, 2; Elizabeth street, 1; Broome street, 1; Pearl street, 2; Washington street, 1.
" 14.—Cherry street, 1; New Bowery, 1; Grand street, 1; Worth street, 1; West Twenty-eighth street, 1; Washington street, 1.
" 15.—Mott street, 1; Monroe street, 1; East Thirty-fifth street, 1; State street, 1; Washington street, 2.
" 16.—Baxter street, 1; Cherry street, 2; Mulberry street, 1; Grand street, 1.
" 18.—Division street, 1; Mott street, 1; Spring street, 1.
" 19.—Willett street, 1; Greenwich street, 1; Mulberry street, 1; West Twenty-third street, 1.
" 20.—Washington street, 1; Mulberry street, 1; Mott street, 1; Hudson street, 1; West Thirty-second street, 1; Oak street, 1.
" 21.—West Fortieth street, 1; Washington street, 1; West Forty-third street, 1; Frankfort street, 1; Cherry street, 2.
" 22.—Cherry street, 3; Oliver street, 1; Roosevelt street, 1; Water street, 1.
" 23.—New Bowery, 1; Oak street, 4.
April 25.—Roosevelt street, 1; Park street, 1; Greene street, 1; Baxter street, 1; West Fortieth street, 1.
" 26.—Cherry street, 1; Mulberry street, 1; Baxter street, 2.
" 27.—Baxter street, 1; Greenwich street, 1; Batavia street, 1; Cherry street, 1.
" 28.—Cherry street, 1; Beekman street, 1; Mulberry street, 1; Madison street, 1.
" 29.—Mott street, 1; Roosevelt street, 2; Elizabeth street, 1; Vandewater street, 1.
" 30.—Water street, 1; Park street, 1; Baxter street, 1; Mott street, 1.
Total No. of houses disinfected in February, March, and April, 242.

The experience of the medical officers in the application of preventive measures was most gratifying. Thorough cleansing and disinfection was almost invariably followed by a complete arrest of the fever in the tenements thus treated. Throughout the entire epidemic a careful watchfulness was maintained over the old fever nests, and it rarely happened that the fever reappeared in a cleansed and disinfected apartment.

The great value of cleansing and lime-washing the apartments of the

sick, in the prevention of relapsing fever, are strongly attested by Mr. Ramsay, inspector of lighting and cleaning in Edinburgh, in the epidemic of 1843. In his report he says: "The effect of these lime-washings on the epidemic has been matter of great interest to myself; and I have watched with the most anxious care to ascertain whether any new cases of fever occurred in dwellings previously subjected to purification, and I have pleasure in saying, that out of a great number of cases reported to me, with two exceptions, the whole turned out to be cases of relapse. That other cases must have occurred, there can be but little doubt; but notwithstanding the pains I have taken to discover them, I have hitherto failed in doing so."

OBSTACLES TO SUCCESS IN THE APPLICATION OF SANITARY MEASURES.

In a disease so clearly spreading by contagion of comparatively feeble intensity, preventive measures ought apparently to be employed with immediate and decided success. In the very nature of the fever, however, we meet with the chief obstacle to success. It is a fever of the unsettled and moving class of the population, over which sanitary authorities have as yet but partial control. One of these persons taking the fever, as we have seen, scatters its germs far and wide before he is arrested. If the fever is mild he may continue his travels during nearly the entire period of his sickness, and thus escape detection, while he establishes a large number of new centres of fever.

In order to obtain complete success in the sanitary management of relapsing fever, as of many other contagious diseases, the vagrant classes must be registered, and placed under such police surveillance that their movements are daily known and recorded. All lodging-houses should also be required to obtain permits from the Board of Health, and such permits should require the proprietor to keep his apartments in proper sanitary condition, and report promptly every case of sickness occurring among his lodgers.

With such knowledge of the situation and condition of the vagrants of the city, who chiefly distribute contagious diseases, it would be possible for the health authorities to promptly suppress an epidemic of relapsing fever.

DREDGING SLIPS.

NEW YORK, November 30, 1871.

The Sanitary Committee respectfully report:

That they witnessed, on last Friday, the dredging of the docks between Thirty-seventh and Thirty-eighth streets, North river. The solid matter taken up by the dredging machine fully corroborated the heretofore expressed opinion, that these docks are the very breeding-spots of obnoxious gases, engendering miasma and malaria, especially during the warm season, when the bubbles of gases, all of them unfit to be inhaled, are continually seen ascending to the surface. The deposits in these docks, for the most part, consist of decaying animal and vegetable matter, turned, after a short time of accumulation, into a mire of a fetid, sticky, black mass, the very sight of which, whenever exposed at low tide, is sickening. During the operation of dredging the smell becomes almost insufferable, even at this season of the year. Your Committee is fully convinced that the stenches so frequently complained of as coming from that neighborhood, have, in part, been owing to these sewer, factory, and slaughter-house discharges not carried off by the tides, and in a comparatively short time forming deposits of four, six, or more feet in depth, as at this very time is the case in the docks contiguous to the one we have seen dredged at our late visit to that locality. While the Commissioners of Docks deserve the thanks of the community for giving their attention to this important subject of dredging the docks, your Committee feel obliged to speak of the necessity of immediate dredging also of the docks from Thirty-eighth to Forty-first street, North river, over which, it appears, the Commissioners of Docks have no control, said docks being private property. Your Committee further recommend the immediate removal of a canal-boat wreck, moored to the rear of the slaughter-house at the foot and in the centre of the dock of Thirty-eighth and Thirty-ninth streets, North river, said wreck serving as a receptacle and landing place of tainted fat and other refuse animal matter, coming, as your Committee are informed, from the establish-

ment of Messrs. Gamble & McNiel, and contributing much to the accumulation of objectionable solid deposits, which in said dock extend almost to the bulkhead line, and have well-nigh filled up the space between the flooring of the adjacent piers and the level of the water at low tide.

G. CECCARINI, M.D.,
STEPHEN SMITH, M.D.,
MAGNUS GROSS.

FAT-MELTING

AT THE FOOT OF EAST FORTY-FOURTH, EAST FORTY-FIFTH, AND EAST ONE HUNDRED AND SIXTH STREETS.

NEW YORK, October 4, 1870.

To the Board of Health:

In relation to remonstrances of citizens against the continuance of fat-melting at the foot of Forty-fourth, Forty-fifth, and One Hundred and Sixth streets, East river, and the dumping grounds on the East and North rivers, severally referred to the Sanitary Committee, the undersigned respectfully report:

Repeated inspections during the summer months of all the slaughter-houses, the fat-melting establishments, the rendering places, the dumping grounds, and similar locations and occupations, furnishing a constant source of complaint to the citizens and public press, and causing no little annoyance to this Board, have convinced your Committee that, short of a thorough reform in the location and management of these various occupations, no satisfactory result can be arrived at. Unless all the slaughtering, of which offal-rendering, fat-melting, tripe-boiling, gut-cleaning, etc., are but the natural offspring, instead of being carried on at about sixty different places, can be concentrated in a few large abattoirs, as has been done in other great cities, there will be no abatement in, or relief from, the constant complaints against what are generally termed nuisances. All efforts of this Board to improve matters in this direction must prove unavailing, as long as there is not a proper public spirit evinced on the part of the press, the citizens, and those directly

concerned, to aid it in its contemplated reforms. It is shocking to see how little correct information and sound judgment in the discussion of these various subjects is generally evinced.

It is practically impossible to render "fresh fat only," while half a dozen or a dozen such establishments have to be supplied by sixty smaller or larger slaughter-houses with the raw material. Throughout the warmer seasons a large proportion of the fat from slaughtered animals must necessarily and speedily become tainted ere it can reach the melting tank, and all technical or chemical contrivances cannot wholly do away with the nauseous smell created by the melting of the once tainted fat. In close connection with capacious abattoirs alone a satisfactory result can be secured.

It is somewhat humiliating that while, for instance, the city of Paris enjoys such institutions since 1812, they are still lacking in this metropolis. But what constitutes an abattoir? By no means a place only, as it seems here to be understood, where the slaughtering of domestic animals of all kinds is carried on by tens of thousands instead of hundreds or dozens, but a place which has the following component parts: fenced spaces or pens for the reception of all the arriving animals, where the butcher can at his leisure find those belonging to him; stables and sheep-folds, where cattle, calves, and sheep are kept and fed until wanted; slaughter-houses, to kill, skin, open, wash, and cut to pieces the animals; blood-receptacles, as no blood must be allowed to run into the sewers or river; melting houses, where the fat is melted for tallow; a tripe house, for the preparation of stomachs, heads, feet, and other secondary parts; hide-salting floors; places of deposit for the offal; water reservoirs; sewers; lodgings and offices for the employés; stables for the butchers' horses, sheds for their carts, etc. It is evident from the very nature of a thus constructed abattoir, that with it many nuisances complained of can be abated, inasmuch as a complete and constant control over every branch and detail of the establishment is made practicable and easy.

All the offal and other refuse animal matter, from whatever source, and all fallen animals, should be speedily forwarded to a rendering place, so situated, arranged, and managed, as to give no reasonable cause for complaint to the neighborhood. The Rendering Company, but lately in existence, instead of seeking the aid of the authorities in order

to find a location where its operations could be carried on without reasonable objection, and in the most approved manner, abruptly broke up, and thereby turned into an offal-nuisance, which outraged this community and all the neighborhood. The scandal of throwing thousands of carcasses, and many hundred tons of offal into the water, and having the same washed on the shores, should and could have been avoided, if good-will and cooler judgment had prevailed. Now-a-days no intelligent nation will comprehend the foolhardy proceeding of giving over unto the water as an irreparable loss, what should be scrupulously returned to the soil, namely, a vast amount of nitrogenous compounds, phosphates, and alkalies. For every ton of useful animal matter thus cast upon the waves of the sea, we have to import additional tons of guano and other fertilizers.

A perfect and well-conducted rendering establishment is not a nuisance, but a blessing to society in more than one respect. Nuisances they are in populous communities if they are neglected, or misdirected, instead of being taken care of and properly regulated. A similar bearing it has with the rendering of all raw or refuse fat; its utmost utilization is not only legitimate and proper, but necessary, for from it comes that indispensable and priceless commodity, *the soap*, of which the great natural philosopher Liebig has so aptly said, "that the quantity of its consumption by a nation was directly indicative of its progress and achievements in civilization, comfort and refinement." Happily, we Americans use soap to excess. To this extensive use of soap we owe in great part the proud distinction of being at once the foremost and the cleanest people on earth, for it matters not whether one looks on this lavish use of soap as the means or as the consequence of our progress in civilization and refinement.

From all these observations, your Committee has come to the conclusion that this Board, in granting or refusing permits to slaughter-houses, fat-melting establishments, and other occupations as aforesaid, must use, irrespective of all public clamor, its own judgment and discrimination, until that time when, by the creation of substantial and well conducted abattoirs, and all their appurtenances, a thorough-going reform in this respect can be brought about.

G. CECCARINI, M.D.
STEPHEN SMITH, M.D.
MAGNUS GROSS.

"L."

REPORT ON PETROLEUM OIL,

WITH SPECIAL REFERENCE TO THE PREVENTION OF THE TRAFFIC IN DANGEROUS KEROSENE AND NAPHTHA.

Col. Emmons Clark,
Secretary of the Health Department of the City of New York:

Sir—I have the honor to submit the accompanying report on petroleum oil, with special reference to the prevention of the traffic in dangerous kerosene and naphtha, in response to the following resolution of the Board of Health:

"*Resolved*, That the Chemist of the Department be and is hereby directed to report in full on the subject of the traffic in dangerous kerosene, giving the advantages and disadvantages of the oil, and what action, if any, this Board can take to prevent the sale of dangerous illuminating fluids."

REPORT.

Although petroleum has been known from time immemorial, and has been collected in considerable quantities in various parts of the world for ages, it was not until American enterprise, in 1859, successfully bored an artesian well, for the express purpose of procuring oil from the rocky strata below, that this cheap and beautiful illuminating oil became an important article of commerce.

The previous introduction of an oil very similar to petroleum in composition, but which was obtained by the destructive distillation of

various bituminous substances, such as cannel coals, asphaltums, and shales, had paved the way for petroleum, which came in at once as a cheaper and purer substitute for the artificial oils. In this country, at least, the manufacture of "coal and shale oil" is a thing of the past.

It is impossible to go back to the time when petroleum was first discovered; its occurrence in abundance in the form of springs of oil in many localities make it evident that it has always been known—certainly more than four thousand years.

The earliest evidence of the use of petroleum is found in the ruins of Nineveh and Babylon. In building both of those cities an asphaltic mortar ("slime" of the Old Testament) was employed, the asphalt for which was a partially evaporated petroleum. That used at Babylon was obtained from the springs of Is, on the Euphrates, which, at a later date, attracted the attention of Alexander, of Trajan, and of Julian; they, even to this day, supply the neighboring villages with oil.

Herodotus, 500 years before Christ, spoke of the oil wells of Zante; and Pliny and Dioscorides described the oil of Agrigentum, which was used in lamps under the name of "Sicilian oil."

In one of the Ionian Islands there is a spring which has yielded petroleum more than 2,000 years.

The wells of Armenia, on the banks of the Zaro, were formerly used for lighting the city of Genoa.

In Persia, near the Caspian Sea at Baku, numerous springs of petroleum have been known from the earliest times.

The springs of Rangoon, on the Irawaddi, have been worked for ages; before the general introduction of petroleum among civilized nations, the yield of the wells in this district is said to have been 400,000 hogsheads of oil per annum.

The perpetual fires burned at Pagan shrines are supposed to have been caused by springs of petroleum, ignited at the surface.

The American Indians collected petroleum, which was sold for various purposes, under the name of Seneca oil. But it seems probable now that, before the Indians, the race of people who worked the copper deposits of Lake Superior and lead ores of Lexington, Ky., and built the mounds in the Western States, also dug numerous wells in Pennsylvania, Ohio, and Canada, to collect the oil which flowed into them. These wells are known, from the trees now growing upon the earth

thrown out in making them, or growing in the wells themselves, to be from 500 to 1,000 years old. One of these, at Titusville, was found after it was cleared out to have been 27 feet deep and five or six feet in diameter, and to be cribbed up with logs to the top. In another, a notched tree was found still standing in the position in which it had been used as a ladder.

In 1819, oil was accidentally obtained in boring two salt wells on the Muskingum river, Ohio. It was used to a limited extent in workshops in the neighborhood, but did not prove a satisfactory substitute for the animal and vegetable oils in use, as the lamps suitable for burning it had not yet been invented. The oil was considered a great evil, on account of its interference with the manufacture of good salt.

In 1829, a flowing well was accidentally obtained at Burkesville, Kentucky, and for two or three weeks the oil flowed over the surface of the Cumberland river, and, becoming ignited, caused some apprehension of a general conflagration among the inhabitants of the towns and villages lower down on the river.

In 1836, from fifty to one hundred barrels of petroleum were collected annually in the valley of the Kanawa, and sold as a medicine.

It was not, however, till oil from coal and shale had been successfully introduced, with lamps specially adapted for this class of oils, that attention was directed to the petroleum springs as likely to furnish a cheap supply of material.

From the time of Hancock and Portlock, who in 1694 made "pitch, tar, and oyls" of a kind of stone, various persons, experts, have made investigations in coal and shale oil.

Selligue, in France, was the first to manufacture an oil (shale oil) on a large scale, and introduced it for lighting. He began his experiments as early as 1834, erecting three factories. He manufactured in the six years between 1838 and 1843, about fifteen thousand barrels (forty gallons each) of shale oil. Still the industry did not extend.

Abraham Gesner made oil from coal in Prince Edward's Island in 1846, and obtained patents, which were sold to the New York Kerosene Company.

In 1850, James Young, of Glasgow, Scotland, introduced paraffin oils, made from cannel coal.

This industry was very profitable, and rapidly extended. It was in-

troduced into Germany, the material being either the Boghead coal from Scotland, or the bituminous shales which abounded in the country.

In the United States, as early as 1850, Luther Atwood experimented on this class of oils, and succeeded in perfecting his "coup oil," made from coal-tar. This was manufactured as a lubricating oil in considerable quantities by Samuel Downer, of Boston.

In 1855 or '56, the Breckinridge coal of Kentucky was used as a material for making oil.

Trinidad pitch, chapopoti from Cuba, candle-tar, and various materials were used for making this oil, but it was found to be more economical to import the Boghead coal from Scotland than to use the cheaper but poorer materials found in this country. The only exception to this statement is the Albertite of Nova Scotia, which yielded larger quantities of oil than any other material; this was, however, monopolized by a single company.

The industry rapidly expanded, and on January 1, 1860, there were forty coal-oil factories on the Atlantic border, all of which used the Scotch Boghead coal, with the exception of two, where Albertite was employed. The total yield of the works amounted to 500 barrels per day, or 200,000 barrels per annum.

This industry was doomed to be very short-lived, for the wells of Pennsylvania yielded in 1860, 500,000 barrels of petroleum; in 1861, 2,000,000 barrels; and in 1862, 3,000,000 barrels. Not only were the coal-oil works at once changed to petroleum refineries, but new refineries were erected all over the country.

In 1854, the Pennsylvania Rock Oil Company had been formed for the purpose of collecting oil at Oil Creek, Pennsylvania,* but collecting the oil from the surface of ditches with blankets, and squeezing it into tubs, was found too expensive a process to compete with the coal-oil manufacture.

In 1858, however, Colonel G. L. Drake, the superintendent of the Company, began to bore an artesian well for oil, much to the amuse-

* The elaborate report of Professor B. Silliman, Jr., on the Petroleum of Venango County, made to this company in April, 1855, is extremely interesting, especially now that the industry has grown to such magnitude and importance. It was reprinted in full in the *American Chemist*, vol. 2, p. 18, July, 1871.

ment of his friends and neighbors, who considered the project most absurd. When, however, on the 26th of August, 1859, he "struck oil," at a depth of seventy-one feet, and obtained 400 gallons of oil a day, which sold for fifty-five cents per gallon, there was a great excitement. Every one who could leave his home rushed to the oil region, a forest of derricks soon appeared in the valley, and numerous wells were bored. Wells were also bored in West Virginia, Ohio, etc.

No mining enterprise had ever offered such sudden fortunes. A well costing a few thousand dollars might yield, in many cases, if successful, from 100 to 2,000 barrels of oil daily, with no expense for pumping.

The Noble well yielded, in a little more than one year, 500,000 barrels of oil. The Sherman flowed 450,000 barrels in about two years.

The poor farmers on Oil Creek, who could not previously have realized more than a few dollars per acre, suddenly found themselves wealthy. Single farms brought their owners from $500,000 to $1,000,000, with a royalty on the wells in addition, in some cases. One man received $3,000 per day royalty from the wells on his farm, and thus accumulated $600,000, all of which was soon squandered.

Without going further into details, I will give here the annual production of oil from the wells.

THE ANNUAL PRODUCTION OF PETROLEUM IN THE UNITED STATES.

Date.	Barrels.
1859	82,000
1860	500,000
1861	2,113,600
1862	3,056,606
1863	2,611,359
1864	2,116,182
1865	3,497,712
1866	3,597,527
1867	3,347,306
1868	3,715,741
1869	4,717,000
1870	6,500,000
Total	35,855,033

5,659,000 barrels of the oil produced in 1870 were obtained from Pennsylvania, the wells then numbering about 3,000; a large portion of this oil (just one half in 1870), was exported to Europe, Australia, Asia, and Africa.

There has thus been developed within the eleven years which have elapsed since the first oil well was bored by Col. Drake at Oil Creek, a most important industry, which exerts an influence on the most remote parts of the globe. It employs thousands of men, builds railroads, freights ships, and lights half the people in the civilized world. Eleven years ago the word petroleum or kerosene* was known only to the scholar or the scientist; now it appears in every newspaper, in the stock list, the price current, and far too often among the accidents and deaths.

It is evident that in framing laws to regulate so important a branch of industry, too careful a study of all the conditions of the traffic cannot be made. I feel justified, therefore, in devoting so much space to this historical and statistical sketch.

COMPOSITION OF PETROLEUM.

Crude Petroleum, as it comes from the wells in Pennsylvania, is generally a dark greenish-brown liquid, of a somewhat offensive odor, varying, in specific gravity or density, from 0.820 to 0.782, or 40° Beaumé to 48° B.† It is chiefly a mixture of a great number of hydrocarbons, compounds of carbon and hydrogen, the average proportion of the two elements in the mixture being:

Carbon	85
Hydrogen	15
	100

* Kerosene was originally a trade mark of a single oil company, and is now used as synonymous with refined petroleum; it should be understood to be restricted to refined oil of about 42° to 48° B.

† Oils, differing from that which occurs so abundantly at Oil Creek, Penn., are obtained in more limited quantities at various localities, some of which are given in the following table:

LOCALITY.	GRAVITY, BEAUMÉ.	COLOR.
Oil Creek, Pennsylvania	43° to 47°	Greenish-brown.
Pit Hole Creek, Pennsylvania	49° to 57°	"
Aileghany River, "	34° to 39°	"
French Creek, "	28° to 31°	"
Burning Spring, West Virginia	42° to 43°	"
Enniskillen, Canada	42° to 43°	Blackish-brown.
Mecca, Ohio	26° to 28°	Yellow.
Amiano, Italy	25° to 50°	Red to straw.

These hydrocarbons differ from each other in volatility. Some are so volatile as to evaporate rapidly at ordinary temperatures, making it dangerous to approach an open tank of petroleum with a flame; others are much less volatile, some requiring a temperature of 700° to 800° F. to vaporize them.

The volatility of these component hydrocarbons is intimately related to their specific gravity or weight, the lightest ones being the most volatile, while the heavier oils possess the higher boiling points.

The inflammability of the oils is also intimately connected with the volatility and specific gravity. The light volatile oils ignite on the approach of a burning match, no matter how cold they may be, while the heavy, less volatile oils can only be ignited when they are heated above the ordinary temperature of the air.

The lighter oils in petroleum belong mostly to the group of hydrocarbons known as the hydrides of the alcohol radicals, or marsh gas series; the heavier oils are believed to belong to the olefines, or ethylene series. Neither of the groups have been fully studied, and the exact constitution of the heavier portions of petroleum has yet to be determined.

Table I. shows the composition, boiling points, and gravities of some of the members of the first group, or marsh gas series.

Table II. shows the composition, boiling points, and gravities of the members of the olefines, or ethylene series.

The first or lowest members of each series are gases at ordinary temperatures; the intermediate members, liquids; the highest members, solids.

TABLE I.

The Hydrides of the Alcoholic radicals, or Marsh Gas Series of Hydrocarbons.

NAMES.	FORMULÆ	CARBON.	HYDROGEN.	BOILING POINTS.	SPECIFIC GRAVITY.	DENSITY BEAUMÉ
Marsh Gas	C_2 H_4	75.00	25.00	A gas.		
Hydride of Ethyl	C_4 H_6	80.00	20.00	A gas.		
Hydride of Propyl	C_6 H_8	81.81	18.19	A gas.		
Hydride of Butyl	C_8 H_{10}	82.80	17.20	34°F.	0.600	106°
Hydride of Amyl	C_{10} H_{12}	83.33	16.67	86°	0.628	98°
Hydride of Hexyl	C_{12} H_{14}	83.72	16.28	154°	0.669	86°.5
Hydride of Heptyl	C_{14} H_{16}	84.	16.00	200°	0.699	72°
Hydride of Octyl	C_{16} H_{18}	84.21	15.79	242°	0.726	64°.5
Hydride of Nonyl	C_{18} H_{20}	84.38	15.62	278°	0.741	60°.5
Hydride of Decatyl	C_{20} H_{22}	84.51	15.49	321°	0.757	56°.5
Hydride of Endecatyl	C_{22} H_{24}	84.61	15.39	360°	0.765	54°.5
Hydride of Dodecatyl	C_{24} H_{26}	84.70	15.30	388°	0.776	52°
Hydride of Tridecatyl	C_{26} H_{28}	84.78	15.22	422°	0.792	48°
Hydride of Tetradecatyl	C_{28} H_{30}	84.85	15.15	460°		
Hydride of Pentadecatyl	C_{30} H_{32} *	84.90	15.10	496°		
	C_{36} H_{34} *	85.04	14.96			
	C_{40} H_{42} *	85.11	14.89			
	C_{46} H_{48} *	85.18	14.82			
	C_{50} H_{52} *	85.23	14.87			
Paraffin	C_{54} H_{56} *	85.26	14.74	Solid.		31°.5
Paraffin	C_{60} H_{62}	85.31	14.69	698°F.		

TABLE II.

The Olefines or Ethylene Series of Hydrocarbons.

COMPOSITION—CARBON, 85.71 PER CENT.; HYDROGEN, 14.29 PER CENT.

NAMES.	FORMULÆ	BOILING POINTS.	SPECIFIC GRAVITY.	DENSITY BEAUMÉ
Ethylene	C_4 H_4	Gas.		
Propylene	C_6 H_6	0° F		
Butylene	C_8 H_8	37°.4		
Anylene	C_{10} H_{10}	95°		
Hexylene	C_{12} H_{12}	156°		
Heptylene	C_{14} H_{14}	203°		
Octylene	C_{16} H_{16}	240°		
Nonylene	C_{18} H_{18}	284°		
Decatylene	C_{20} H_{20}	320°		
Endecatylene	C_{22} H_{22}	384°	0.782	50°
Dodecatylene	C_{24} H_{24}	421°		
Decatritylene	C_{26} H_{26}	455°	0.791	48°
Cetene	C_{32} H_{32}	527°		
	C_{10} H_{10}			
Cerotene	C_{54} H_{54}		Solid.	Solid.
Melene	C_{60} H_{60}	707°	Solid.	Solid.

REFINING PETROLEUM.

The dark offensive petroleum is subjected to a process of refining in order to separate from the portion designed for burning in lamps,

First—The lighter oils, which are very inflammable, and, owing to their volatility, evolve vapors at ordinary temperatures which, when mixed with the proper proportions of air, constitute explosive mixtures.

Second—The heavier oils, which do not burn well in lamps, but are excellent lubricators. From these oils is obtained, by chilling and pressing, the solid paraffin which is used for candles, for waterproofing cloth, etc.

Third—The tarry matter which would crust the wicks of the lamps.

Fourth—The coloring matter.

Fifth—The compounds which cause the offensive odors of the crude oil.

Refining, as usually practised, involves three successive operations:

First—Fractional distillation.

Second—Agitation with sulphuric acid.

Third—Agitation with hydrate of soda or ammonia.

A few refiners improve the quality of their refined oil by redistilling it after the treatment with acid and alkali.

Fractional Distillation.—The apparatus employed consists of an iron still, provided with a coil or worm of wrought-iron pipe, which is submerged in a tank of water, for the purpose of cooling it. When the still has been filled with crude oil the fire is lighted beneath it, and soon the oil begins to boil. The first products of distillation are gases; at ordinary temperature they pass through the coil and escape without being condensed. By cooling the oil with ice or by compressing these gases by an air-pump into a strong receiver, very volatile liquids called "rhigolene" and "cymogeme" are obtained.

Soon the vapors begin to condense in the worm, and a stream of oil trickles from the far end of the coil into the receiving tank. The first oils obtained have a gravity of about 95° Beaumé; as the distillation proceeds the product becomes heavier, 90° B., 85° B., 80° B., 75° B., 70° B., and so on.

In most establishments it is customary to run the product into one tank till the gravity reaches 65° B. to 59° B.; the product known as

crude naphtha, being subsequently separated by redistillation into (1) gasolene, the lightest; (2) naphtha; (3) benzine. When the stream of oil runs from the coil with a gravity from 65° to 59° B., it is diverted into the kerosene tank and continues to run into this receiver till the gravity reaches about 38° B., or until the color deepens to a yellow. This second fraction is the burning oil or kerosene, and is subsequently purified by sulphuric acid and alkali.

After taking off the burning oil, the stream is directed to the paraffin oil tanks, and continues to run there till nothing remains in the still save coke. The last products have a gravity of about 25° B.

This oil is chilled to crystallize the paraffin, and is then folded in cloths and exposed to hydraulic pressure to squeeze out the oil. The solid paraffin is purified by repeatedly melting it in naphtha, chilling, and pressing. The oil separated from it is purified with sulphuric acid and alkali and used for lubricating purposes.

The following table will give a clear idea of the fractional distillation, and its various products:

Products of the Distillation of Crude Petroleum.

PRICE IN BULK, 14 CENTS PER GALLON.

Gravity, Beaum.	Name.	Percentage yielded.	Gravity, Beaumé.		Price per gallon. In bulk.	Price per gallon. Retail.
Gases.				Uncondensed, Loss.		
115° B. to 105° B.	Cymogene	....	110°	Condensed by pump, made by one firm only for an ice machine, boils at 32° F.	$1 50	
105° B. to 95° B.	Rhigolene	....	100°	Condensed by ice and salt, used as an anæsthetic, boils at 65° F.	$1 00	
95° B. to 80° B.	Gasolene	1½	85° to 90°	Condensed in worm by cold water, used in "air gas machines" and gas "carbonizers."	35 cts. to 18 cts.	
80° B. to 65° B.	Naphtha	10	71° to 76°	For *oil cloths*, cleaning, etc.; so-called "Safety oil," "Danforth's oil," "American Safety Gas," etc.; for adulterating kerosene; cleaning oil wells.	7 cts. to 5 cts.	13 cts. to 20 cts.
65° B. to 60° B.	Benzine	4	62° to 65°	For paints and varnishes	16 cts. to 12 cts.	20 cts. to 16 cts.
60° B. to 38° B.	Kerosene or Refined Petroleum.	55	46°	Ordinary oil for lamps	20 cts. to 25 cts.	30 cts. to 40 cts.
38° B. to 25° B.	Paraffin oil	19½	30°	Semi-solid when cold. Chilled and pressed to separate paraffin, oil used for lubricating	18 cts. to 14 cts.	
	Coke, Gas, & loss	10				
	Total	100				

While this is a general outline of the process of distillation, it should be remarked that refiners differ in the details of the operation.

When very large stills are employed, of a capacity from one thousand to thirty-five hundred barrels, the distillation is not continued till coke is formed; but is interrupted when there remains in the still a thick tarry residuum amounting to from five to ten per cent. of the original oil. This residuum is afterwards distilled to coke in smaller stills.

By slow distillation in high stills the heavier oils are "cracked" into lighter oils, so that the refiner need not produce any heavy oil. In many of the largest establishments only three products are obtained from crude oil:

1. Crude naphtha.
2. Burning oil.
3. Residuum.

The *burning oil* is deodorized and bleached for market with sulphuric acid and alkali; the *crude naphtha* is sold for from 3 to 5 cents per gallon, and poured down the oil wells, nominally *to clean them*, but practically to be sold to the refiner again in the crude oil at 14 cents per gallon; or it is sold to be redistilled for gasolene, refined naphtha, and benzine. The well owners are many of them dishonest enough to pour the naphtha into the crude oil tank. The adulteration averages fifteen per cent. The residuum is sold to be distilled for paraffin and lubricating oil, or it is cracked in high stills, and the product put into the large stills with the crude oil. In this case no lubricating oil or paraffin are manufactured. This is the practice at Cleveland and Pittsburg. Some redistil the last ten per cent., the colored portions of the burning oil, with the crude oil.

Some place the crude petroleum in large stills and blow steam through it, and thus take off the crude naphtha, before the oil is run into the fire still.

Some manufacturers who pride themselves upon the superior quality of their special brands of oil, separate certain portions of the distillate, and send them to market as unusually safe oils.

The "*Astral Oil*" is probably the oil which runs from about 54° to 44° B., in other words, the "heart" of the burning oil. As it does not contain the lighter portions of the ordinary oil, its flashing point is 125° F., or 25° above the standard of safety, although its average

gravity is 49° B. The "*Mineral Sperm*" is a heavy oil, which probably runs between 40° B. and 32° B., averaging 36° B. This is so heavy, and requires so high a temperature to volatilize it, that it does not evolve an inflammable vapor below 262° F., nor take fire below 300° F. Practically it is as safe as whale oil.

Treatment with Acid.—After the oil has been fractioned it is subjected to the action of sulphuric acid to remove a little color, but more particularly to *sweeten* it, *i. e.*, to remove the disagreeable odor which it still retains. About two per cent., by measure, of acid is poured into the oil, the mixture is thoroughly agitated, and, on standing, a dark tarry sediment separates; this is removed, and the clear oil is then agitated with water, then with alkali, either caustic soda or ammonia. This neutralizes the last traces of acid and, after removal by water, leaves the oil "*sweet.*" Some of the more careful refiners then subject it to a somewhat elevated temperature to expel a small percentage of naphtha or benzine which it still contains.

Why most of the Kerosene in the Market is unsafe.—The crude naphtha sells at from three to five cents per gallon, while the refined petroleum or kerosene sells for twenty to twenty-five cents. As great competition exists among the refiners, there is a strong inducement to turn the heavier portions of the naphtha into the kerosene tank, so as to get for it the price of kerosene. They change the direction of the stream from the coil of the still when it reaches 65° to 63° B., instead of waiting till it reaches 58°. Thus the highly volatile explosive naphtha or benzine is allowed to run into the kerosene, rendering the whole highly dangerous. Dr. D. B. White, President of the Board of Health of New Orleans, found that, experimenting on an oil which flashed at 113° F., an addition of

One	per cent.	of	naphtha	caused	it	to flash at.....	103° F.
Two	"	"	"	"	"	"	92°
Five	"	"	"	"	"	"	83°
Ten	"	"	"	"	"	"	59°
Twenty	"	"	"	"	"	"	40°

After the addition of twenty per cent. of naphtha, the oil *burned* at 50° F.

It is, therefore, the cupidity of the refiner that leads him to run as

much benzine as possible into the kerosene, regardless of the frightful consequences which result from the frequent explosions.

On every gallon of naphtha run into the kerosene tank there is a profit to the refiner of twenty cents, or on every per cent. of naphtha added to the kerosene a reduction of one fifth cent per gallon in the cost of production, which, with kerosene at twenty-five cents per gallon, amounts to one and one-fourth per cent. For every gallon of naphtha sold as kerosene, the refiner can afford to throw away four gallons. Nothing is more desirable than the discovery of some use to which the naphtha can be put, which will make such a demand for it as to raise its value above that of kerosene, that it might be the interest of the refiner to separate as much instead of as little as possible. It must not be supposed that the specific gravity of the oil can be considered a safe index of its quality; on the contrary, the specific gravity gives very little idea of the quality, for while naphtha tends to render the oil lighter, the average gravity of good oil is maintained by the heavier oils present. A poor, dangerous oil may be heavier than a safe oil.

The *Astral Oil* illustrates this fact; while it does not flash below 125° F., its gravity is 49° B.

Ordinary kerosene flashes at 86° F., but has a gravity of 47° B.

THE CHEAPEST PROCESS FOR MAKING A SAFE OIL.

The cheapest process for making an oil that will not flash, that is, emit an inflammable vapor, below 100° F., is the following:

(1) Run off the naphtha down to 58° B., instead of 65° to 62°, the usual point.

(2) Then expose the oil in shallow tanks to the sun or diffused daylight for one or two days.

The increased expense of this plan of refining would not reach more than three or four cents per gallon. This addition would be cheerfully paid by the consumer, to insure himself and his wife and children from a horrible death.

But, the refiner says, I cannot get the advanced price because the consumer does not know my oil is safer than the cheaper article. This is true, and our only hope is in strict laws, rigidly enforced, which will make it a crime to sell an unsafe oil.

THE YIELD OF DIFFERENT PRODUCTS.

The yield of the different products from crude petroleum varies greatly in different refineries. The following is a fair average for Pennsylvania oil of about 45° B.:

Gasolene	1½
Refined naphtha	10
Benzine	4
Refined petroleum or kerosene	55
Lubricating oil	17½
Paraffin	2
Loss, gas, and coke	10
	100

By cracking, the same oil could be made to yield:

Crude naphtha	20
Burning oil	66
Coke and loss	14
	100

ADVANTAGES OF PETROLEUM.

The great advantages of petroleum, which led to so sudden a revolution in the system of artificial illumination all over the world, causing the old lamps designed for whale, sperm, and vegetable oils and for camphene to be thrown aside and to be replaced by the new lamps, are the cheapness of this oil, the brilliancy of the light, and the freedom of the flame from smoke.

Although the first oil was struck in Colonel Drake's well on Oil Creek as recently as August 28, 1859, or only eleven years ago, the average *daily* production in the United States has now reached the enormous amount of 22,000 barrels of over forty gallons each.

The wells on Oil Creek now run more oil in a fortnight than was captured per annum by the entire fleet of six hundred vessels which sailed from Nantucket, New Bedford, Stonington, New London, and Providence in the palmiest days of the whale fishery.

The results of a series of experiments made by Dr. J. G. Pohle, E. G. Kelly, and the writer, a committee of judges for the American Institute Fair, is plainly not out of place here, as giving an exact basis for a comparison of kerosene oil with other illuminating materials.

The standard of comparison is a sperm candle which burns two grains per minute, or 120 grains per hour. The oils tested were entered for competition, and are the safest oils in the market, as is shown by the following statement of their flashing and burning points:

	Specific Gravity. Degrees Beaumé.	Flashing Point. Inflammable vapor evolved.	Burning Point. Oil takes fire.
Required by Board of Health ordinance	.....	100° F.	110° F.
Standard Kerosene	46° B.	115°	128°
Astral Oil	49°	125°	138°
Mineral Sperm	36°	262°	300°

The "*Standard Kerosene*" and "*Astral Oil*" are superior varieties of *kerosene*. The "*Mineral Sperm*" is a much heavier oil and is not what is generally known as *kerosene*. It is not well adapted for flat wick lamps, as, when the level of the oil in the reservoir of the lamp is two or three inches below the flame, the oil is not readily drawn up by the flat wicks. In argand burners, which have a circular wick, and in which the reservoir is placed at one side so high that the oil is brought near the level of the flame, the supply is maintained and the flame retains its original size and brilliancy as long as there is any oil in the lamp.

The following table shows the rate of consumption and illuminating power of these oils:

Rate of Consumption and Illuminating Power of Petroleum Oils.

Name of the Oil.	Hours required to burn one gallon of oil.	Average candle-power of the flame.	Pounds of candles equivalent to one gallon of oil.	Hours required to burn one gallon at rate of eight candles power.
I. Low glass lamp, ⅜-inch flat wick—				
Standard kerosene	200	4.26	14.54	106.5
Astral oil	179.5	4.77	14.67	107
II. High glass lamp, ½-inch flat wick—				
Standard kerosene	109	8.9	16.6	121
Astral oil	112	7.7	14.38	108
III. German student lamp, argand, circular wick—				
Standard kerosene	69	14.7	17.44	127
Astral oil	81.6	11.1	15.57	113
Mineral sperm	90	11.6	17.85	130
IV. Merrill's patent lamp, argand, circular wick—				
Standard kerosene	94.5	12	19.38	142
Astral oil	102.5	11.47	20.17	147
Mineral sperm	105.5	11.83	21.14	156

From these figures it appears that in lamps of the sizes generally used, the illuminating power of the kerosene flame is equal to from eight to nine sperm candles, with the flat wick, and to from eleven to fifteen candles, with the round wick, and that a gallon of oil lasts from 70 to 109 hours in such lamps, and gives an amount of light equivalent to that which is afforded by from 14½ to 20 pounds of sperm candles.

The heavy *Mineral Sperm* oil adds to the advantage of a degree of safety almost equal, in fact practically equal, to whale oil, that of giving an amount of light equal to about 21½ lbs. sperm candles.

The ordinary gas burner, burning five feet of gas per hour, gives, if the gas is of good quality, a light equal to 16 candles.

From these figures it follows, therefore, that

One gallon *Standard Kerosene* is equivalent, at 40 cents per gallon, to,

In flat wick lamp,	302	feet	gas, costing	$0.91
German student lamp,	317	"	"	0.95
Merrill's lamp,	355	"	"	1.06
Average,	325	"	"	0.97

One gallon *Astral Oil* is equivalent, at 50 cents per gallon, to,

In flat wick lamp,	295	feet	gas, costing	$0.88
German student lamp,	282	"	"	0.85
Merrill's lamp,	367	"	"	1.10
Average,	315	"	"	0.94

One gallon of *Mineral Sperm* is equivalent, at 75 cents per gallon, to,

In German student lamp,	325	feet	gas, costing	$0.97
Merrill's lamp,	390	"	"	1.17
Average,	358	"	"	1.07

One thousand feet, sixteen-candle gas, costing $3.00, is equivalent to

3.25	gallons	common kerosene,	flashing at	86° F.,	costing,	at 30 cts.	per	gal....	$0.97
3.08	"	standard	"	115° F.,	"	40	"	....	1.23
3.17	"	Astral oil,	"	125° F.,	"	50	"	....	1.58
2.80	"	Mineral sperm,	"	262° F.,	"	75	"	....	2.10

The average cost per hour of light equal to eight sperm candles is,

From sperm candles, at 42 cents per pound							$5\frac{76}{100}$ cents.
Gas, at $3 per 1000 feet							$0\frac{75}{100}$ "
Mineral sperm oil, in German student lamp, at 75 cents per gallon							$0\frac{57}{100}$ "
" "	Merrill's	"	"	"	"		$0\frac{48}{100}$ "
Astral oil,	flat wick	"	50	"	"		$0\frac{46}{100}$ "
"	German student	"	"	"	"		$0\frac{44}{100}$ "
"	Merrill's	"	"	"	"		$0\frac{34}{100}$ "
Standard kerosene, in flat wick		"	40	"	"		$0\frac{33}{100}$ "
"	German student	"	"	"	"		$0\frac{31}{100}$ "
"	Merrill's	"	"	"	"		$0\frac{28}{100}$ "
Common kerosene, unsafe, in flat wick lamp			30	"	"		$0\frac{27}{100}$ "

In addition to the advantages of economy, brilliancy, cleanliness, and absence of smoke, it should be mentioned that kerosene never freezes, and never becomes rancid. The only real objection, but, nevertheless, a most serious objection, raised against kerosene, is the

danger arising from its inflammability, and the combustible vapors which are evolved at ordinary temperatures by most of the oils in common use.

The oils used in the experiments above narrated do not belong to this class; they are perfectly safe, and we shall show that every refiner has it in his power to manufacture a safe oil at an expense of not over three to five cents per gallon more than it costs him to make the dangerous oil now generally sold. It is, moreover, shown in the last table, that the difference in the cost of the same amount of light when obtained from safe or unsafe oils, burned in flat wick lamps, between "standard kerosene," which flashes at 115° F., and is safe, and common oil which flashes at 86° F. (the average of the unsafe oils sold in New York), is only six one-hundredths of a cent per hour, or one cent for sixteen hours.

Certainly an illuminating material which gives, in a cheap lamp, an amount of light equal to that of eight sperm candles, at a cost of one third of a cent an hour is an inestimable boon to the world. It adds several hours to the length of the day, and enables the working-classes to devote the long evenings to the improvement of their minds by reading; or where the labors of the day must be prolonged into the night, it saves the eyes from the inevitable ruin which would follow the use of insufficient light. The sanitary advantages of a clear, smokeless light are inestimable. Without attempting to follow out all the good influences which may be attributed to the new illuminating material, it is safe to say that petroleum is one of the great civilizing agents of the nineteenth century.

NAPHTHA AND BENZINE UNDER FALSE NAMES.

Processes have been patented, and venders have sold rights throughout the country for patented and secret processes for rendering gasolene, naphtha, and benzine non-explosive.

Thus treated, these explosive oils, just as explosive as before the treatment, are sold throughout the country under trade names, such as "Liquid Gas," "Aurora Oil," "Safety Gas," "Petroline," "Puroline," "Black Diamond," "Septoline," "Anchor Oil," "Sunlight Non-explosive Burning Fluid," etc., etc. These processes are not only totally ineffective, but they are ridiculous; roots, gums, barks, and salts are turned indiscriminately into the benzine, to leave it just as explosive as before.

In the patent-office report for 1866 are fourteen such patents for "burning fluids," a few of which are quoted by way of illustration:

No. 57,095.—Gasolene, 40 gallons; gum olibanum, 1 pound; cascarilla bark, ½ pound; lichen, ½ pound.

No. 57,390.—White-oak bark, 2 pounds; alkinet root, 2 pounds; salt, 2 pounds; alcohol, 1 pint; cyanide of potassium, 1 ounce. To be added to 3 gallons naphtha to make it non-explosive.

No. 57,749.—Naphtha, 40 gallons; carbonate of soda, 3 pounds; alum, 2 pounds; hydrate of lime, 2 pounds; slippery elm, 2 pounds; gum camphor, ½ pound; oil of sassafras, 4 ounces; essence of tar, 1 ounce.

No. 58,180.—Naphtha, 40 gallons; potatoes, 50 pounds; lime, 4 pounds; sal soda, 4 pounds; curcuma, 3 pounds.

No. 58,905.—Gasolene, 40 gallons; sal soda and cream of tartar, one pound each, to make the oil safe. Oil of winter-green to remove unpleasant odor.

No. 59,797.—Gasolene, 40 gallons; sulphur, 5 pounds; rusty iron, 100 pounds; onions, 1 bushel; rosin, 5 pounds.

No. 60,559.—Naphtha, 40 gallons; caustic soda, 1 pound; alum, 1 pound; salt, 1 pound; manganese, 1 ounce; water, 4 ounces.

The following is a copy of the printed license to manufacture "Sun-light oil," one of these murderous frauds. It is sold to single families at two dollars each. The likeness of Madam Culver is omitted here, and the type is set on a narrower page; the text is, however, exactly copied.

Recipe and Directions for Manufacturing the Sun-Light Oil.

"To make one gallon, take 3 quarts of Benzine, 1 oz. of pulverized Alum, 1½ ozs."
"Alcohol, 2 ozs. Cream Tartar, 2 ozs. Sal Soda, 1 pint of potatoes, (cut fine,) 2 table-"
"spoonsful of fine Salt, 2 drachms Oil of Sassafras, 4 drachms Gum Camphor. Dissolve"
"the Alum in the Alcohol as much as possible, then add the Gum Camphor, stir for a few"
"minutes, then add to one pint of the Benzine; stir it well for ten minutes, then add all"
"the other ingredients except the Benzine; then add the remainder of the Benzine; leave"
"it open and exposed to the air for about fifteen minutes, then cork or cover it tight, and"
"in two hours' time it will be fit for use, although it should stand, if convenient, for"
"forty-eight hours before using. This is the proportion for one gallon, and the person"
"who purchases the ingredients of a retail druggist for a single gallon will be charged two"
"or three times the wholesale price for a single gallon of Benzine, as many retail drug-"
"gists often buy but a few gallons at a time and have to pay about twice the wholesale"

"price. You are to use Benzine of 65 or 72 gravity, which costs but 12½ cents per gallon"
"in New York, Chicago or Cleveland, and but 8 cents in Pittsburg."

"The ingredients used in one gallon will answer for ten gallons by adding 8½ gallons of"
"Benzine, one quart Potatoes and one pint fine salt. The Sun-Light Oil should always"
"be used with a patent or Sun-Light Burner. ☞ Any individual detected making or"
"selling the Sun-Light Oil without a right from us will be prosecuted as an infringer."

"(Not transferable.) Beware of Counterfeits.—No Right genuine unless it has upon"
"the upper left hand corner the likeness of Madame Culver, wife of the late Dr. S. A."
"Culver, the inventor of this Oil."

The following circular is used to secure agents and purchasers for this villanous fluid:

"THE SUN-LIGHT OIL."

"THE BEST BURNING OIL IN THE WORLD."

"*Dr. Culver's Celebrated Sun-Light Oil is one of the Greatest Discoveries of the Age.*"
"*M. Wagner & Co. are Sole Proprietors for the United States and*"
"*Canadas. Sold only by their Authorized Agents.*"

"COSTS BUT TWENTY-EIGHT CENTS PER GALLON TO MANUFACTURE,"
"And can be manufactured anywhere in the United States and Canadas."

"This wonderful oil, which is about to take the place of kerosene and other burning"
"fluids, is composed of materials which can be obtained in any country village. Can be"
"made without the aid of machinery, by simply mixing the ingredients together. It"
"has no offensive smell whatever, and is"

"WARRANTED TO BE NON-EXPLOSIVE."

"It burns without any smoke, and gives a softer and far more brilliant light than any"
"other oil now in use, and is only equaled in brilliancy by gas-light. The ingredients"
"which compose it are simple and cheap, costing but twenty eight cents per gallon at the"
"highest, and can be procured in any city or country village in the United States. A"
"gallon of the oil can be made in five minutes, and a whole barrel in less than half an"
"hour. Wherever it has been introduced it takes the place of kerosene and other"
"burning fluids, for the following reasons:"

"1. Because it does not cost half as much; 2. It can be made anywhere by anybody;"
"3. *It will never explode;* 4. *It will burn in any lamp, with or without a chimney;* 5."
"It will not smoke the chimney; 6. It will give no bad odor or offensive smell; 7."
"It will not soil clothes, if spilled upon them; 8. It gives a clear and steady light,"
"never flickers, and in softness and brilliancy is only equaled by gas; 9. It will"
"burn one fourth longer than the best kerosene made; 10. It does not weaken the"
"eyes or lungs, as kerosene or coal oil does, by continued use. And, finally, it is"
"cheaper and better in every respect than any other oil ever invented."

"For lighting stores, hotels, and public places of all kinds, there is no oil that will at"
"all compare with this in cheapness, brilliancy, and safety. For night lamps in hotels,"

" public and private houses, it is invaluable, and can be used in small lamps as well as "
" large ones, without chimney, giving out no smoke or smell, and does not encrust the "
" wick."

" Although this oil has been before the public but a few months, *nearly* 350,000 *families* "
" *are making and using it.* And wherever it has been introduced, kerosene and other "
" burning fluids have been laid aside. This celebrated oil was discovered and first in- "
" vented in June, 1867, by the great French chemist and geologist, the late Dr. S. A. "
" Culver, of Paris. *Fortunately for us, being near relatives of his, we succeeded, before his* "
" *death, in obtaining the sole right to manufacture and sell the oil in all parts of the United* "
" *States and Canadas.*"

" In order to bring this oil into universal use throughout the country, we have con- "
" cludedto sell it only through agents. By this method families can manufacture the oil "
" themselves, thus getting it at original cost and saving all the profits that would be made "
" by merchants and speculators, if sold through them. The oil can be manufactured "
" anywhere for twenty-eight cents per gallon, and in many places for much less. And "
" while the cost is small, you have a light with which you can always feel safe, for it can "
" in no way be made to explode ; and the softness and brilliancy of the light will render "
" cheerful the kitchen, the parlor, and the place of business. It gives a clear and steady "
" light ; and one gallon, with the same lamp and the same sized blaze, will burn six and "
" one-quarter hours longer than the best kerosene. It is certainly "

" ONE OF THE GREATEST WONDERS OF THE AGE."

" All we ask is, that the public give this oil a general investigation ; that they test its "
" merits and its qualities for themselves, and then, finding (as they surely will) that it is "
" laden with results that will be beneficial to all persons in every city, village, and "
" farm-house in our land, we respectfully ask that they lend their influence in our behalf "
" to aid in its advancement and circulation."

" Such a demand is there for this oil, that some of our agents, who are energetic, are "
" now making, on an average, from $400 to $500 per month, clear of all expenses, "
" and the demand for it is constantly increasing. We shall endeavor to establish at least "
" one agent in every county in the United States and Canadas ; and the right to manu- "
" facture can only be obtained from him or from us. Again we remark, that all we de- "
" sire is that every family test the merits of this wonderful oil, which they can do when "
" the agent calls ; and after they have thoroughly tested its qualities, it would be but "
" waste of time and breath for the agent, or for us, to ask them to purchase the right "
" to manufacture their own oil, for there is not one family out of every thousand but "
" that would have the right to manufacture the oil, even if the price of a Family "
" Right were five times as high as we have placed it. In order that all may be benefited "
" by this oil, and none, however poor they may be, need be prevented from using it "
" and enjoying its benefits, we have placed the price of Family Rights at the small sum "
" of two dollars each."

"*Agents Wanted in every County not yet Taken.*"

" If further information is desired, address, with stamp,"

" M. WAGNER & CO.,"
" Marshall, Mich."

No wonder we have kerosene accidents, with agents scattered through the country selling county rights, and teaching retail dealers how to make these murderous "non-explosive" oils.

The experiments these venders make to deceive their dupes are very convincing. None of the petroleum products are explosive *per se*; nor are their vapors explosive under all circumstances when mixed with air. A certain ratio of air to vapor is necessary to make an explosive mixture. That this is true is proved by the air gas machines, which are simply contrivances designed to saturate air with gasolene or benzine vapor, when it burns like ordinary coal gas.

Equal volumes of vapor and air will not explode; three parts of air and one of vapor give a vigorous puff when ignited in a vessel. Five volumes of air to one of vapor give a loud report. The maximum degree of violence results from the explosion of eight or nine parts of air mixed with one of vapor.

It requires considerable skill to make AT WILL an explosive mixture with air and naphtha, and it is consequently very easy for the vender NOT TO MAKE ONE.

In most cases the proportion of vapor is too great, and on bringing a flame in contact with the mixture it burns quietly. The vender to make his oil appear non-explosive, unscrews the wick tube and applies a match, when the vapor in the lamp quietly takes fire and burns without explosion.

Or he pours some of the "safety oil" into a saucer and lights it. There is no explosion, and ignorant persons, biassed by the saving of a few cents per gallon, purchase the most dangerous oils in the market.

It is not possible to make gasolene, naphtha, or benzine safe by any addition that can be made to it. Nor is any oil safe that can be set on fire at the ordinary temperature of the air.

The sale of these explosive oils under false names has largely increased. Two years ago we knew of only one wholesale dealer in this city, G. L. Smith & Co., of No. 120 Maiden lane and No. 40 East Broadway.

This firm supplied "Liquid Safety Gas" at wholesale and retail, stating it to be non-explosive.

Recently other establishments have been opened, prominent among

which is that of G. M. Danforth & Co., principal office, No. 953 Broadway.

The character of this oil, which is simply benzine of 68° B., is clearly shown by the following accidents which it has occasioned:

"SYRACUSE, N. Y., November 11, 1870.

"About 4 o'clock on the morning of November 2, there being sickness in my family, I got up and lighted a lamp containing what was represented to me to be 'Danforth's Non-Explosive Petroleum Fluid.' I returned to bed a few minutes after, turning the wick down—nearly out. It was not more than half an hour thereafter before my wife discovered the flame issuing from the top of the chimney. She immediately awoke me, and I endeavored to put it out, first by blowing, and then by smothering it with a shawl and bed-quilts, but was unsuccessful. I then took the lamp and started to carry it out into the kitchen, but it exploded in my hand in the hall, bursting the lamp, the burning fluid setting fire to my clothing, burning my hand quite severely, and burning my foot slightly. This was unquestionably a square *bona fide* explosion.

"(Signed) JESSE JAMES.

"No. 132 Shonnard street, Syracuse."

"SYRACUSE, N. Y., October 10, 1870.

"Last evening, after returning from church, I lighted a lamp filled with 'Danforth's Non-Explosive Petroleum Fluid,' which my groceryman says he got of A. Shaw & Co., No. 2 Downer Block. In a moment after the wick became ignited, the lamp exploded, the glass flying in every direction, setting fire to my dress, table-spread, etc. My hand was badly burned. If it had not been for the assistance of neighbors my house would have been burned undoubtedly.

"(Signed) MARY H. LINSDAY.

"No. 177 East Fayette street, Syracuse.

"NOTE.—Mrs. Linsday's right hand was burned so badly that she could not write, and she authorized another party to attach her name to the above."

"SYRACUSE, N. Y., October 14, 1870.

"I hereby certify that I was experimenting a few days since, in the presence of Mr. T. S. Truair, Stanley Bagg, A. Shaw, agent of the fluid, and others, with what was represented to me to be 'Danforth's Non-Explosive Petroleum Fluid,' when there occurred a small explosion of its vapor, mixed with atmospheric air, as I brought a lighted match to the mouth of a small retort which contained a quantity of the fluid that had been slightly warmed.

"(Signed) FRANCIS E. ENGELHARD, Dr.,

"Chemist for the Salt Company of Onondaga.

"The undersigned do hereby certify that they witnessed the above explosion.

"H. L. PALMER. JOHN J. TRUAIR,

STANLEY BAGG, T. S. TRUAIR."

"The house of Alexander Brown, No. 167 East Fayette street, came near being destroyed by fire by the use of this fluid. The family went out one evening, leaving the lamp lighted. It was not long before the neighbors had the privilege of extinguishing a fire which had got just nicely a going, originating from an explosion of the lamp, by all appearances."

"Mr. Gay P. Barber, No. 7 Tully street, called on his insurance agent the other day with a small bill of damages caused by an accident with the 'Danforth Fluid.'"

"CLEVELAND INSURANCE COMPANY,
CLEVELAND, OHIO, October 12, 1870.

"C. B. WHITING, Esq., State Agent, Home Insurance Company, New York, Syracuse, N. Y.:

"DEAR SIR—In reply to yours, 8th instant, what we think of it is expressed in enclosed circular, at which time 'Danforth's Burning Fluid' was in full blow here. We have not changed our ideas since. Several accidents have occurred from it here. At Girard, Pa., it exploded and burned a servant girl to death. At Medina, the agent experimenting with it came near losing his life. Presume other special cases can be found, but this is sufficient.

"Truly yours, (Signed)

"S. S. COE, *Secretary.*"

"We have it from very good authority that the recent $30,000 loss at Dexter, Jefferson county, N. Y., was caused by an explosion or accident with this gunpowder fluid."

From the Albany Argus, February 28, 1871.

"The jury, after deliberation, returned the following verdict:

"That the said Susan V. Scott came to her death by burns received at her residence in Lumbar street on the evening of February 1 while engaged in filling a lamp with the so-called Non-explosive fluid; and further, that from experiments made by Dr. Charles H. Porter, we find that such fluid is of an explosive and highly dangerous character.

"Professor Porter testified that he placed a small quantity of Danforth's oil in an empty can, and applied a light, when an explosion resulted, tearing open the can."

From the Insurance Monitor.

"*A Horror in Poughkeepsie.*—Poughkeepsie, Dec. 29.—Last night, John Lockhart's house, 447 Main street, was the scene of a shocking accident. About seven o'clock last evening, Mary Gibson and a little daughter of Mr. Lockhart were seated at a rear room up-stairs, sewing.

"On the table was a lamp filled with Danforth's non-explosive oil. This lamp suddenly exploded, and the oil was scattered over Mary Gibson, who ran to a pantry, and, procuring some blankets, endeavored unsuccessfully to smother the flames. With a shriek the little girl left the room, and ran down stairs to inform the family.

"In the meantime, Mary Gibson, suffering excruciating pain, had fallen on the floor nearly exhausted, and was crawling on her hands and knees toward the door leading to the entry when Mr. Lockhart arrived, and, to use his own expression, 'the flames were then three feet high all around the poor girl.' Mr. Lockhart made three attempts to tear the clothes off Mary, but was each time unsuccessful, terribly burning his own hands and arms.

"By this time the sufferer had reached the southern end of the hallway, where clothing was heaped upon her by Mr. and Mrs. Lockhart, the poor creature being then unconscious. As soon as it was deemed prudent the clothing was removed, the flames being smothered.

"The girl's face, arms, and breast, and portions of her body were shockingly burned.

"While Drs. Cooper, Carter, and Tuthill were dressing the burns, the poor sufferer shrieked: 'I will live to see him die yet!' The physicians have no hopes."

From the Girard (Pa.) Cosmopolite, March 25, 1870.

"*Horrible Accident.*—Another victim of cheap burning fluid. A young woman burned to death by the explosion of Danforth's Non-Explosive Fluid.

"The awful catastrophe which it is our painful duty to chronicle occurred at the Martin House at 5 o'clock last Monday afternoon. Ellen Shannon, a waiter girl employed in the hotel, lit a lamp suspended by a bracket at the further end of the dining room. The lamp was filled with 'R. F. Danforth's Non-Explosive Burning Fluid;' and as she turned to step down from the chair upon which she was standing, it exploded, scattering the liquid-scorching-death all over her light clothing. No other person was in the dining room at the time, but the noise of the explosion and the shrieks of the girl attracted the attention of Mr. Northrup. Upon opening the door to ascertain the cause of the uproar, he was appalled by confronting Ellen, whose person was so completely enveloped in flames as at first to create the impression that the hall was in a blaze. She fell down, uttering the most heart-rending and agonizing screams. It was found, upon examination, that at least two-thirds of her body had been burned to a blister. The poor victim of this 'non-explosive burning fluid' was particularly afraid of it, and was more than ordinarily cautious in handling it on that account. The bracket had been blown from its socket, the large and strong reflector and the lamp shivered into a thousand pieces. There was not even the lame excuse that the lamp was only partially filled, for it had been thoroughly filled that afternoon.

"The accident was due solely to the explosive character of the fluid, which evolves gas at a temperature of less than fifty degrees, as we saw demonstrated by actual tests."

Here is a copy of the circular which is used in introducing this murderous oil:

"DANFORTH'S NON-EXPLOSIVE 'SUNLIGHT' BURNING FLUID."

"A patent distillation from Crude Petroleum. The acme of success! The biggest" "thing of the age! Endorsed by thousands of people and Insurance Companies."

"The thousands of families, manufacturers, transportation companies, and dealers," "who are using or selling our fluid, ask no more information than their experience" "furnishes, but for those not so fortunate, we present the following answers to our" "daily increasing inquiries, which embody most of the information desired:"

WE CLAIM

"1. It is non-explosive. See the wonderful tests wherever it is sold."

"2. It is *fifty per cent. cheaper* than ordinary burning fluids or oils in the market."

"3. It gives a whiter, larger, and more brilliant light."

"4. It burns without smoke or smell."

"5. It does not carbonize or corrode the wick."

"6. It is free from grease or oil."

"7. It will burn in *any lamp*."

"8. It is the poor man's blessing. It receives the rich man's thanks."

"9. It can be supplied at less than one-half the expense usually paid for ordinary" "burning fluid or oils, in any quantity, and shipped to any part of the world in barrels" "or cans."

"Parties who desire to become interested in the sale or use of this valuable fluid," "are cordially invited to call on or address us, and further information will be given" "to convince them of the great value, economy, brilliancy, and safety of the 'Sun-" "light' burning fluid over all others. Our two large distilleries, which are under the" "personal supervision of Mr. Danforth, enable us to supply any demand which may" "be made by parties who desire to purchase territory for the *exclusive* right to sell" "G. M. Danforth's Non-explosive 'Sunlight' Burning Fluid, secured to him by" "letters patent from the United States, to whom we can offer extraordinary induce-" "ments at less than one half the price paid for kerosene oil."

"Our agents supplied with lamps, chimneys, wicks, cans, etc., at the manufac-" "turer's cash rates."

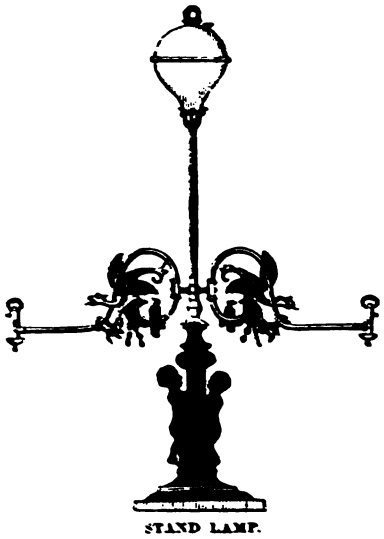
"*Read This.*—As this is a great illuminator for the million, we take extraordinary" "pains at all times to show to the poor its meritorious qualities. Believing in the equali-" "zation of mankind, we are always happy to exhibit 'G. M. Danforth's Sunlight" "Burning Fluid' to man, woman or child."

"Address, G. M. DANFORTH & Co.,"
"Principal office, 953 Broadway, New York."

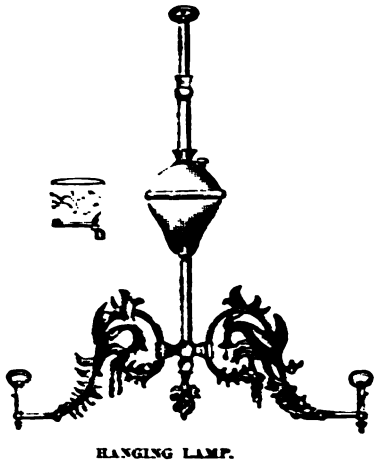
Special lamps, some of them of very elegant design, have been introduced for burning the liquid gas (naphtha). They are all provided with a reservoir for the dangerous fluid, and a burner by which it is vaporized, and burns like gas.

The cuts represent some of these dangerous contrivances.

GRAY'S PATENT.



STAND LAMP.



HANGING LAMP.

NOVELTY PORTABLE GAS-LIGHT.

The apathy of the public in regard to this matter is beyond my comprehension. These facts are well known in almost every community, and yet, although it is now twelve or thirteen years since this class of oils came into general use, we have as yet no adequate legislation for the protection of life or property. Nothing but the most stringent laws, making it a State-prison offence to mix naphtha and illuminating oil, or to sell any product of petroleum as an illuminating oil or fluid to be used in lamps, or to be burned except in air gas machines, that will evolve an inflammable vapor below 100° F., or, better, 110° F., will be effectual in remedying the evil. In case of an accident from the sale of oil below the standard, the seller should be compelled to pay all damage to property, and if a life is sacrificed should be punished for manslaughter. It should be made extremely hazardous to sell such oils.

Naphtha, under whatever name it passes, is in one respect more dangerous than gunpowder. Gunpowder never explodes unless fire is brought to it. Naphtha, on the other hand, sends out its inflammable vapor and brings the fire from a distance. Gunpowder is thus a passive agent, while naphtha is an active one; and when introduced under the treacherous disguise of a safe oil, it is not to be wondered that frightful accidents occur.

"VAPOR" AND OTHER NAPHTHA STOVES.

In this connection the "vapor stoves" demand some consideration. These stoves are supplied with naphtha (sold under various names) from a reservoir at one side, the supply being regulated by a stop-cock. The naphtha flows into a tube or chamber, which is maintained at a high temperature by the combustion; here it is vaporized to escape through suitable orifices and burn. These stoves are arranged for cooking, as well as for heating apartments. These contrivances are all, without exception, highly dangerous. They are supplied with benzine or naphtha, which is always liable take fire and to produce explosive vapors.

Some of these vapor stoves are here represented.

THE VAPOR STOVE.

D. H. LOWE'S PATENT.

Three accidents have occurred in this city recently from their use. November 6, 1870, a fire occurred at No. 573 West Fifty-second street, caused by the explosion of a coal-oil stove. Damage, one hundred dollars.

December 31, 1870, John Higgins, aged forty, was severely injured, at No. 309 East Thirty-first street, by the explosion of a vapor stove.

February 7, 1871, a fire occurred at No. 360 Broadway, caused by the explosion of a gasolene stove. One of the firm occupying the floor was engaged in lighting a fire in the stove, when a slight explosion occurred, and in an instant the flames had communicated with the reservoir of gasolene, which supplied the stove. Fed by this inflammable material the fire soon extended throughout the entire floor.

The entire damage to the building and its contents amounted to seventy-five thousand dollars.

May 7, 1871, a liquid gas-stove exploded in the apartments of James Hughes, in the rear of the second of the five-story tenement house

A
D
B
W. ROBERTS. Sr.

No. 179 Greenwich street. The explosion scattered the burning liquid with which the stove was lighted all over the room. Mrs. Bridget Hughes, who was sitting near the stove when the explosion occurred, had her clothing set on fire, and she was so terribly burned that her life was despaired of. Mrs. Welsh, who was also in the room, was terribly burned by her clothing taking fire. Hughes, while endeavoring to extinguish the flames, was badly burned about the hands and face.

These stoves have been but recently introduced; when they shall have been more generally adopted we may expect accidents to multiply rapidly. A keg of gunpowder in a building is not as dangerous as one of these stoves.

THE SO-CALLED SAFETY LAMPS.

An indefinite number of safety lamps have been patented with a view to make it possible to burn the explosive, inflammable naphthas without danger. Many of these have been submitted to me for examination, and the conviction is unavoidable that they are anything but a blessing. No matter how well they realize the idea of protecting the oil they contain from explosion, they are treacherous friends. They allay one's fears of explosive oils, and the accident, which is always much more likely to occur outside than within lamp, is just as likely to take place.

The lamp is dropped and broken; it is filled while burning; the servant neglects to screw in the wick tube; the oil can is upset or left uncorked, or the servant uses the oil to kindle the fire. In some way or other fire gets to the vapor of oil, and an explosion occurs. Even when the "safety lamp" has an ally in the form of a "safety can," it still fails to make naphtha safe. It is an axiom that *no lamp is safe with dangerous oil, and every lamp is safe with safe oil.*

Half the so-called "safety lamps" are no safer than those which make no claim to safety; while the other half are only safe as long as they are in perfect order and subject to no carelessness in the filling or handling. Persons will be careless and thoughtless; it is human nature to be so. What we want is *safe oil; with it all lamps will be safe.* The safety lamp is positively objectionable, as it leads persons to purchase dangerous oils without question.

TESTING KEROSENE.

The operation of testing kerosene is very simple. It is merely ascertaining the temperature at which the oil evolves an inflammable vapor, the "flashing-point," and the temperature at which the oil takes fire, "the burning-point." But when I say the operation is very simple, I do not mean to say that any person is qualified to make the test in a reliable manner until he has been properly instructed. In careless, ignorant hands results may deviate twenty or thirty degrees from the truth; while in skilful hands four or five degrees will cover the most divergent results.

1. A suitable apparatus is required; the tester described in the schedule of the English Petroleum Act (Fig. 1) is a very good one*; the open tester of Tagliabue (Fig. 3) is a very good instrument, but should be protected from currents of air, when in use, by a screen.

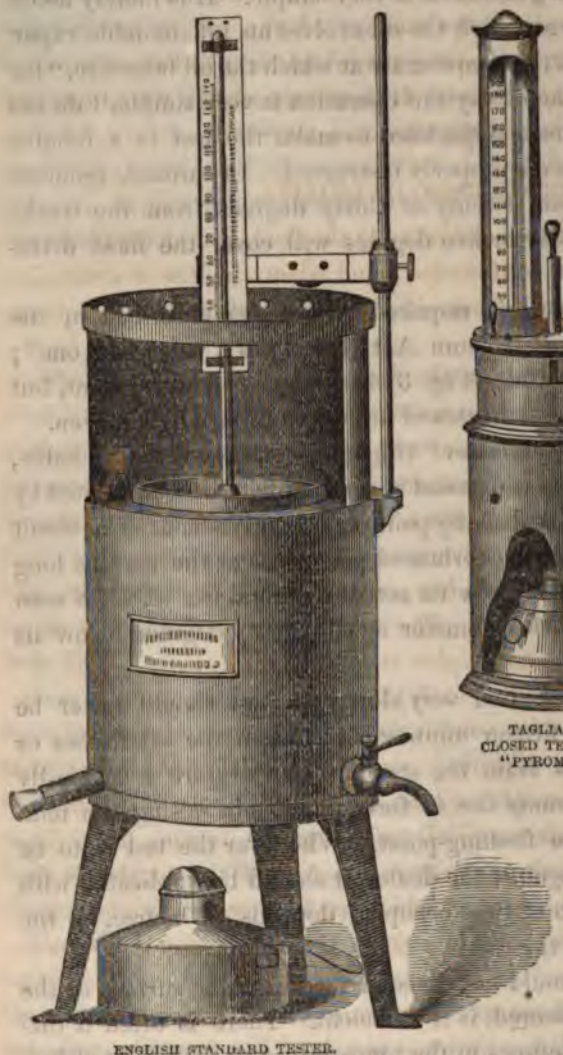
The closed tester, or "pyrometer" (Fig. 2), I consider very unreliable, as the mass of metal which is exposed is very liable to become heated by the burning vapor after the flashing-point has been reached. The result of this is the igniting of the overheated petroleum at the surface long before the thermometer records its actual temperature. I have seen the oil ignite while the thermometer stood twenty degrees below its proper burning point.

2. The oil should be heated very slowly; a test should never be completed in less than fifteen minutes; and when the oil flashes or burns but a few degrees from the standard temperature, it is hardly safe to spend less than twenty-five to forty minutes in raising the temperature of the oil to the flashing-point. Whenever the test is to be used in a prosecution against the dealer, it should be duplicated with special care. The length of time occupied depends, of course, on the size of the flame beneath the tester.

3. The thermometer should not descend far below the surface of the oil; if the bulb is well covered, it is sufficient. There is often a difference of a number of degrees in the temperature of the oil at different depths. It is well to stir the oil before applying the flame.

* This instrument is described in detail in the schedule of the English law, page 575.

FIG. 1.



ENGLISH STANDARD TESTER.

FIG. 2.

TAGLIABUE'S
CLOSED TESTER, OR
"PYROMETER."

FIG. 3.

TAGLIABUE'S OPEN TESTER.

4. Care should be taken, in making the test, to use a very small flame for trying the oil. I have used, with entire satisfaction, a minute gas-flame, burning from a glass tube drawn to a fine point; this is attached to a burner by a flexible rubber tube. This flame should not be thrust against the surface of the oil in making the flashing-test, as it might, by heating the oil, cause it to flash a number of degrees below the proper point. It should merely be flitted quickly across the surface after noting the thermometer.

THE STANDARD OF QUALITY.

There are two distinct tests for oil: (1) *the flashing test*, (2) *the burning test*, which are often confounded; and when the law or ordinance specifies *the fire test*, there is a doubt as to which of the two tests is intended.

The flashing test determines *the flashing point* of the oil, or the lowest temperature at which it gives off an inflammable vapor.

This is by far the most important test, as it is the inflammable vapor, evolved at atmospheric temperatures, that causes most of the accidents. Moreover, an oil which has a high flashing test is sure to have a high burning test, while the reverse is not true.

The burning test fixes the burning point of the oil, or the lowest temperature at which it takes fire. The burning point of an oil is from ten to fifty degrees Fahrenheit higher than the flashing point. The two points are quite independent of each other; the flashing point depends upon the amount of the most volatile constituents present, naphtha, etc., while the burning point depends upon the general character of the whole oil. Two per cent. of naphtha will lower the flashing point of an oil ten degrees without materially affecting the burning test. The burning test does not determine the real safety of the oil, that is the absence of naphtha The standard which has been generally adopted as a safe one fixes the flashing point at 100° F., or higher; and the burning point at 110°, or higher.

In the English act and some of the more recent laws of the States of the American Union, the burning test has been very judiciously omitted, as two distinct tests are often confusing, and, moreover, the burning test or point is not an index of the safety of the oil. More than half of all the samples of oil which have been tested for the Health

Department did not take fire below 110° F., consequently they were safe according to the burning test, but only 28 of 736 samples were really safe, all the rest evolving inflammable vapors below 100° F.

The flashing test should therefore be the only test mentioned in laws framed to prevent the sale of dangerous oils.

What flashing point should be selected as a standard of safety, is a question on which there is some difference of opinion. The higher the flashing point the safer the oil. Animal and vegetable oils do not flash below 500° to 600° F., hence it is impossible to have an explosion or any burning accident with a lamp or can filled with such an oil. The flashing point should be somewhat higher than the highest temperature the oil ever reaches in the lamps or cans. Our highest summer temperature does not far exceed 90° F., though a can of oil placed in the sun or near a fire might become much hotter.

The point of 100° F. does not seem to me to be high enough to secure immunity from danger, though it may be said very few, if any, accidents occur with oil which does not flash below this temperature. In some of the laws 110° is fixed as the flashing point, and in one of them 120° F. With a view to throwing some light on this question, an investigation was made of the temperature of the oil in burning lamps, the results of which are presented in the following tables:

THE TEMPERATURE OF OIL IN BURNING LAMPS.

FIRST SERIES.—*Temperature of the Room 73° F. to 74° F.*

No.	Kind of Lamp.	Capacity of Lamp.	TEMPERATURE OF THE OIL.				
			After one hour.	After two hours.	After four hours.	After seven hours.	Average for the seven hours.
1	Brass hand-lamp.....	8 oz.	85° F.	82° F.	85° F.	86° F.	84°.5 F.
2	Brass hand-lamp.....	24 "	79°	83°	84°	82°	82°
3	Glass stand-lamp.....	8 "	77°	78°	79°	80°	78°.5
4	Glass stand-lamp.....	11 "	77°	81°	84°	82°	81°
5	Glass stand-lamp.....	20 "	78°	79°	79°	80°	79°
6	Glass stand-lamp.....	7 "	82°	80°	85°	84°	82°.75
7	Glass stand-lamp.....	10 "	84°	86°	84°	82°	84°
8	Glass hand-lamp.....	9 "	79°	78°	85°	85°	81°.75
9	Glass hand-lamp.....	6 "	81°	82°	86°	86°	83°.75
10	Glass hand-lamp.....	7 "	80°	78°	....	...	79°
11	Brass student-lamp.....	13 "	82°	80°	83°	84°	82°.25
12	Glass stand-lamp.....	10 "	81°	81°	79°	78°	79°.75
13	Brass stand-lamp.....	11 "	92°	89°	88°	86°	88°.75
14	Tin lantern.....	7 "	89°	86°	88°	87°	87°.5
15	Glass bracket-lamp.....	19 "	82°	83°	84°	83°	82°.75
16	Glass stand-lamp.....	29 "	82°	80°	80°	84°	81°.5
17	Brass student-lamp.....	7 "	80°	....	88°	....	84°
18	Brass stand-lamp.....	14 "	84°	85°	87°	87°	85°75.
19	Brass stand-lamp.....	12 "	100°	100°	92°	91°	95°75.
20	Metal stand-lamp.....	9 "	82°	82°	88°	87°	84°.75
21	Brass stand-lamp.....	12 "	91°	92°	88°	85°	89°
22	Bronze stand-lamp.....	16 "	83°	76°	79°	85°	80°.75
23	Glass hand-lamp.....	.. "	79°	80°	82°	82°	80°.75

With the air of the room at from 73° to 74° F., the temperature of the oil in the burning lamps ranged from 76° to 100° F., the highest temperature of 100° having been reached in a metal lamp at the end of one hour. That this was an exceptionally high temperature is shown by the fact that the highest temperature reached in any other lamp was 92° F. The following is a synopsis of the observations:

	23 Lamps.	11 Metal Lamps.	12 Glass Lamps.
Highest temperature reached..	100°	100°	86°
Lowest " " ..	76°	76°	76°
Average temperature.....	83° F.	86°	81°

SECOND SERIES.—*Temperature of the Room 82° F. to 84° F.*

No.	Kind of Lamp.	Capacity of Lamp.	TEMPERATURE OF THE OIL.				
			After one hour.	After two hours.	After three h'rs.	After four h'rs.	Average for four hours.
	Air of room.....	.....	82°	83°	84°	83°	83°
1	Brass hand-lamp.....	8 oz.	92°	95°	96°	95°	94°.5
2	Brass hand-lamp.....	24 "	88°	94°	94°	93°	92°.25
3	Glass stand-lamp.....	8 "	84°	88°	86°	84°	85°.5
4	Glass stand-lamp.....	11 "	84°	86°	86°	84°	85°
5	Glass stand-lamp.....	20 "	85°	86°	87°	86°	86°
6	Glass stand-lamp.....	7 "	86°	87°	88°	88°	87°.25
7	Glass stand-lamp.....	10 "	88°	87°	89°	88°	88°
8	Glass hand-lamp.....	9 "	87°	90°	90°	90°	89°.25
9	Glass hand-lamp.....	6 "	87°	91°	89	87°	88°.5
10	Glass hand-lamp.....	7 "	84°	86°	86°	84°	85°
11	Brass student-lamp.....	13 "	86°	88°	88°	88°	87°.5
12	Glass stand-lamp.....	10 "	85°	86°	86°	85°	85°.5
13	Brass stand-lamp.....	11 "	104°	103°	101°	101°	102°.25
14	Tin lantern.....	7 "	95°	96°	94°	96°	95°.25
15	Glass bracket-lamp.....	19 "	84°	85°	84°	84°	84°.25
16	Brass stand-lamp.....	29 "	84°	85°	84°	84°	84°.25
17	Grass student-lamp.....	7 "	87°	88°	86°	84°	86°.25
18	Brass student-lamp.....	14 "	91°	93°	92°	91°	91°.75
19	Brass stand-lamp.....	12 "	101°	100°	98°	96°	98°.75
20	Metal stand-lamp	9 "	89°	92°	94°	93°	92°
21	Brass stand-lamp.....	12 "	88°	98°	94°	96°	94°
22	Bronze stand-lamp	16 "	82°	88°	88°	89°	86°.75
23	Glass hand-lamp.....	6 "	84°	86°	85°	84°	84°.75
24	Brass student-lamp.....	10 "	120°	120°	120°	118°	119°.5
25	Brass student-lamp.....	12½"	112°	115°	115°	116°	115°

With the air of the room at from 82° to 84° F., the temperature of the oil in the burning lamps ranged from 82° to 120° F. The temperature 120° was exceptional, being confined to one lamp.

SYNOPSIS OF OBSERVATIONS.

	In 13 Metal Lamps.	In 13 Glass Lamps.	In 25 Lamps.
Highest temperature reached..	120° F.	91°	120°
Lowest " " ..	82°	84°	82°
Average " " ..	96½°	86°	91½°

THIRD SERIES.—*Temperature of Room 90° F. to 92° F.*

No.	Kind of Lamp.	Capacity of Lamp.	TEMPERATURE OF THE OIL. After one hour.	After two hours.	After three hours.	After four hours.	Average for four hours
	Air of the room.....	.....	92°	90°	92°	90°	91°
1	Brass hand-lamp.....	8 oz.	90°	98°	100°	98°	96°.5
2	Brass hand-lamp.....	24 "	89°	98°	102°	100°	97°.25
3	Glass stand-lamp.....	8 "	88°	90°	93°	94°	91°.25
4	Glass stand-lamp.....	11 "	88°	92°	94°	94°	92°
5	Glass stand-lamp.....	20 "	85°	92°	94°	94°	91°.25
6	Glass stand-lamp	7 "	90°	94°	96°	93°	93°.25
7	Glass stand-lamp.....	10 "	90°	96°	96°	96°	94°.5
8	Glass hand-lamp	9 "	88°	95°	98°	98°	94°.75
9	Glass hand-lamp	6 "	89°	95°	96°	97°	94°.25
10	Glass hand-lamp	7 "	88°	92°	93°	94°	91°.75
11	Brass student-lamp.....	13 "	89°	100°	102°	102°	98°.25
12	Glass stand-lamp.....	10 "	88°	92°	93°	93°	91°.5
13	Brass stand-lamp	11 "	106°	114°	116°	110°	111°.5
14	Tin lantern.....	7 "	99°	106°	107°	105°	104°.25
15	Glass bracket-lamp.....	19 "	85°	92°	91°	91°	89°.75
16	Glass stand-lamp.....	20 "	86°	91°	92°	92°	90°.25
17	Brass student-lamp.....	7 "	92°	99°	100°	100°	97°.75
18	Brass student-lamp.....	14 "	94°	100°	100°	100°	98°.5
19	Brass stand-lamp.....	12 "	108°	112°	112°	107°	109°.75
20	Metal stand-lamp	9 "	91°	96°	100°	99°	96°.5
21	Brass stand-lamp.....	12 "	104°	110°	108°	106°	107°
22	Bronze stand-lamp.....	16 "	84°	90°	95°	98°	91°.75
23	Glass hand-lamp	6 "	90°	92°	94°	94°	92°.5
24	Brass student-lamp.....	10 "	124°	129°	120°	128°	127°.5
25	Brass student-lamp.....	12½ "	120°	126°	127°	127°	125°

With the air of the room at from 90° to 92° F., the temperature of the oil in the burning lamps ranged from 84° to 129° F. The highest temperature being exceptional.

SYNOPSIS OF THE OBSERVATIONS.

	In 25 Lamps.	In 13 Metal Lamps.	In 12 Glass Lamps.
Highest temperature observed..	129°	129°	98°
Lowest " " ..	84°	84°	85°
Average " " ..	98¾°	104½°	92⅓°

By these results it appears that the temperature of the oil in lamps often rises much above 100° F., thus reaching a temperatue at which oil, *which does not emit a combustible vapor below* 100° *F.*, would be dangerous. It is apparent that 100° F. is too low a standard for safety; 120° F. would not be too high a standard, and its adoption would not add three cents per gallon to the cost of the oil.

PUBLIC OPINION NO CHECK ON THE MANUFACTURE AND SALE OF DANGEROUS OILS.

As long as larger profits can be gained by selling naphtha, benzine, and dangerous kerosene, than by selling safe oil, public opinion cannot, at least in large cities, check the barbarous traffic. That it has not been checked in New York, but has increased, is shown by the statistics for the past year. On January 11, 1869, the dangerous character of the oils sold in the Metropolitan District was reported to the Board of Health in response to an inquiry. The report was published in most of the daily papers, was circulated in pamphlet form, and was incorporated in the annual report of the Board. Moreover, from that day to this, articles, communications, and editorials have constantly appeared in the papers. It may be fairly assumed that the public is fully informed on the subject. Now, if we consult the statistics we shall find that Fire Marshal McSpedon reported:

	1869.	1870.
Total fires in New York	913	866
Fires caused by kerosene and naphtha liquid gas	96	157
Percentage of fires due to kerosene, etc	11	18

Nearly twice the percentage of fires by kerosene in 1870, as in the previous year. Of the 157 fires caused by dangerous oils, 116 were caused by kerosene, 41 by "liquid gas." Deaths known to have been caused by kerosene and liquid gas (naphtha), twenty-one (21). Deaths from clothes taking fire, cause not stated, certainly some from kerosene, thirty-nine (39). Fire Marshal Keady reported:

	1869.	1870.
Total fires in Brooklyn	311	285
Fires caused by kerosene oils	31	31
Percentage of fires due to kerosene	10	11

"Twenty human beings," concludes the report, "were burned to death in Brooklyn last year (1870), just double the number of deaths from fire during the year previous. Now as to the cause? I answer, *kerosene*. In nearly every case the cause of death may be traced to the explosion of a kerosene lamp, or to a fire caused by kerosene. Some of the victims poured kerosene oil on stove-fires to make them burn more rapidly, and have been burned to death in the experiment, but in most cases the lamp has been the destructive agent. Twenty fatal cases in one year! Need more be said against the use of so dangerous an article as kerosene?"

There came to my knowledge, in two years, by the ordinary channels of two daily papers, and the usual sources of information, the following frightful list of kerosene accidents in the United States, which is necessarily very imperfect:

	1869.	1870.
Deaths from kerosene and liquid gas	52	84
Serious injuries " "	50	50
Slight " " "	6	11
Total	108	145

A notable feature of these accidents is the fact that the victims are generally women or children. The fearful railroad accident which occurred at New Hamburg on February 6 (1871), in which twenty-two persons were killed, the greater number burned to death by crude petroleum, is one of the saddest illustrations of the inflammability of this oil. February 16, another railroad accident occurred on the same road, in which a car was thrown from the track, and a passenger seriously burned by an explosion of naphtha, used for lighting the car.

It is a very common practice now, at least in this city, to light street cars and stages with lamps supplied with naphtha. Aside from the danger of explosion, the imperfect combustion makes the air very offensive. This is specially noticeable in the Fifth avenue stages, in which the air is often nauseating from the offensive odors of partially burned naphtha.

CHARACTER OF THE OILS NOW SOLD IN NEW YORK.

To determine whether there has been any improvement in the quality of the oils sold in New York, one hundred samples were recently purchased at retail stores in various parts of the city. The following tables embrace the results of the investigation, which are arranged in three tables.

Table I. includes the safe oils, which do not emit inflammable vapors at temperatures below 100° F.

Table II. includes the unsafe kerosenes, which emit inflammable vapors below 100° F.

Table III. includes the highly dangerous naphthas and benzines which are sold as safe oils.

In all the tables the samples are arranged in the order of safety, beginning with the safest.

TABLE I.

SAFE DEPOSIT TILE WHICH DO NOT EXIT AN INFLAMMABLE VAPOR BELOW 200°

NUMBER.	DATE OF PURCHASE.	NAME OF DEALER.	LOCALITY.	MINIMUM FLASHING.	AVERAGE FLASHING.	AVERAGE BURNING.
58	March, 1897	T. P. Dennison	211 Sixth avenue	405	415	15
59			16 West Houston street	405	415	15
60			130 Ninth avenue	405	415	15
61			22 Bleecker street	405	415	15
62		D. Dunbar	18 Lane street	405	415	15
63		Hoffmann	1265 Second avenue	405.5	415.5	15
64		J. G. Heinmann & Co.	324 Greenwich street	405.5	415.5	15
		Average		405.1	415.1	15

TABLE II.

DANGEROUS DEGREE OF TILE WHICH EXIT AN INFLAMMABLE VAPOR AT A TEMPERATURE BELOW 100° F.

NUMBER.	DATE OF PURCHASE.	NAME OF DEALER.	LOCALITY.	MINIMUM FLASHING.	AVERAGE FLASHING.	AVERAGE BURNING.
58	March, 1897	W. Weber & Co.	731 Third avenue	400		
			42 Tenth avenue	400		
			Pearl street	400.5		
			441 East Houston street	400.5		
		Kane	831 Third avenue	400.5		
			361 Second avenue	400.5		
		Bell, Gelin & Co.	581 Seventh avenue	400.5		
			1322 Tenth avenue	400.5		
		—— Lynch	1574 Bowery	400.5		
			447 East Nineteenth street	400.5		
		—— Keating	Varick and Downing streets	400.5		
			30 Lafayette street	400.5		
		E. Bullen	72 Bedford street	400.5		
			130 Grand street	400.5		
		T. Edge	508 Grand street	400.5		
			321 Greenwich street	400.5		
		Edge	446 Third avenue	400.5		
			224 East Forty-first street	400.5		
			352 Tenth avenue	400.5		
			18 Park street	400.5		
			Forty-third street and First avenue	400.5		
			98 East Houston street	400.5		
			351 West Forty-fourth street	400.5		
			208 William street	400.5		
		Stevenson	124 Water street	400.5		
		Kane	52 Pine street	400.5		
		Fox	170 Second avenue	400.5		
			1488 Broadway	400.5		

NUMBER.	DATE OF PURCHASE.	NAME OF DEALER.	LOCALITY.	SPECIFIC GRAVITY. BEAUME.	FLASHING POINT.	BURNING POINT.
	1871.					
76	March 8	.....	67 East Houston street.....	47	91	103
80	8	.....	176 Avenue A.....	47.5	91	114
2	3	C. H. Steinkamp....	863 Second avenue.....	48	90	100
4	3	J. H. Feimeyer.....	859 Third avenue.....	46.5	90	105
12	4	.....	326 East Twenty-eighth street....	47	90	110
22	4	W. J. Close & Co....	5 Chatham square.....	47.5	90	100
33	6	P. Riley.....	695 Third avenue.....	47.5	90	113
35	6	E. Von Lilienthal...	847 Sixth avenue.....	47	90	102
40	6	L. Stroh.....	353 West Thirty-seventh street...	47	90	113
45	6	F. Gorey.....	442 West Twenty-eighth street....	47	90	115
51	7	G. H. Hillgé.....	87 Greenwich avenue.....	47.5	90	103
57	7	H. Ringen.....	102 Eighth avenue.....	47.5	90	109
64	7	J. H. Coke.....	141 West Thirty-ninth street.....	46	90	114
82	7	.....	628 East Ninth street.....	48	90	113
91	9	J. Read, Jr., & Co.	101 Hudson street.....	46	90	112
95	9	.....	75 Washington street.....	47	90	98
98	9	.....	7 Church street.....	48	90	113
90	9	M. Knieff.....	166 West Broadway.....	47	89	110
6	4	Mrs. Young.....	763 Third avenue.....	48	88	98
17	4	.....	115 Ridge street.....	47	88	106
31	6	F. Beuse.....	765 Second avenue.....	46.5	88	98
36	7	H. Bahr.....	63 West Forty-fourth street.....	48.5	88	108
69	7	.....	72 Bayard street.....	47	88	116
78	8	.....	427 East Nineteenth street.....	47.5	88	108
50	7	H. Kugeler.....	386 Bleecker street.....	47.5	87	108
87	8	M. Blumenthal.....	408 Madison street.....	46	87	110
1	3	F. Bohde.....	825 First avenue.....	48	86	96
41	6	D. Boosman.....	451 Ninth avenue.....	47	86	110
52	7	.....	235 Sixth avenue.....	47	86	101
74	7	.....	3 Dover street.....	47.5	86	112
44	6	C. W. Sherwood....	328 Tenth avenue.....	46	85	100
47	6	.....	649 Washington street.....	46	85	110
49		B. H. Pelzer.....	381 Bleecker street.....	46.5	85	99
84	8	.....	31 Avenue C.....	47	85	110
88	8	.....	814 Second avenue	47	85	101
96	9	M. Henken.....	40 Greenwich street.....	47	84	114
13	4	.....	140 East Houston street.....	47.5	83	112
28	6	A. W. Lemcke.....	682 Greenwich street.....	47	83	100
39	6	F. Liss.....	568 Eighth avenue.....	47.5	83	98
46	6	.....	315 Seventh avenue.....	47	83	98
56	7	.....	135 Seventh avenue	47	82	104
94	9	.....	26 Rector street.....	47.5	82	100
9	4	W. Holweg.....	206 Third avenue.....	47	81	92
11	4	.....	344 East Twenty-third street.....	47.5	81	95
25	6	.....	Morton and Bedford streets.....	48	81	98
53	7	.....	453 Sixth avenue.....	47	81	105
55	7	.....	139 West Nineteenth street.....	47	81	93
83	8	.....	170 Avenue C.....	46.5	81	101
24	6	A. Cole.....	468 Hudson street.....	46.5	80	97
48	7	F. Ostermeyer.....	119 Christopher street.....	47	80	97
58	7	.....	86 Ninth avenue.....	47.5	80	99
100	9	F. Meincke.....	15 Worth street.....	47	80	102
63	7	.....	606 Eighth avenue.....	46.5	79	102
23	6	J. A. Blair.....	Bedford and Carmine streets.....	46	78	102
26	6	L. Immer.....	83 Bedford street.....	46.5	78	98
42	6	.....	444 Tenth avenue.....	47	77	100
93	9	.....	59 West street.....	46.5	74	100
		Average	.....	47	86.6	107

TABLE III.

HIGHLY DANGEROUS OILS. NAPHTHAS OR BENZINES, SOLD AS SAFE OILS, WHICH EVOLVE INFLAMMABLE VAPORS AND TAKE FIRE AT ALL TEMPERATURES.

No.	Date of Purchase.	Name of Dealer.	Locality.	Specific Gravity Beaume.	Flashing Point.	Burning Point.
	1871.					
21	March 4..	G. L. Smith...	40 East Broadway.	73	All temperatures, even down to 0° F.	All temperatures, even down to 0° F.
81	" 8..	.....	162 Avenue A.....	72.5		
15	" 4..	.....	177 Ludlow street..	72		
20	" 4..	.....	2 Pike street.....	72		
16	" 4..	.....	331 E. Houston st..	70		
68	" 7..	.....	164 Grand street...	70		
79	" 8..	.....	418 E. Fifteenth st.	70		
65	" 7..	.....	358 Bowery	68.5		

In my last report on kerosene oil seventeen localities were mentioned where naphtha was sold for illuminating purposes. These establishments were all visited during the present investigation. At six of them naphtha is still sold; at four of them it is not sold at present; at the other seven localities the business has chanhed and no oils are sold. Thirteen other localities were mentioned where oils almost as dangerous as naphtha were sold. These were all visited, and it was found that at six of them the business had changed; but at the other seven where kerosene was still sold, the quality of the oils had considerably improved.

In 1869 the following results were obtained:

Safe oils evolving no inflammable vapors below 100° F	21
Dangerous kerosene oils flashing below 100° F	586
Gasolenes, naphthas, and benzines, sold as safe oils	29
Total unsafe oils	615
Total number tested	636

The recent investigation of March, 1871, gives:

Safe oils, evolving no inflammable vapors below 100° F	7
Dangerous kerosene oils, flashing below 100° F	85
Naphthas, sold as safe oils	8
Total unsafe oils	93
Total number tested	100

The seven safe oils varied in density from 46° B. to 47° B., averaging 46° B. They flashed at from 100° F. to 114° F., averaging 104° F. They took fire at from 120° F. to 131° F., averaging 126° F.

The eighty-five dangerous kerosenes varied in density from 46° B. to 48° B., averaging 47° B. They flashed at from 74° F. to 99° F., averaging 86.6° F. They took fire at from 92° F. to 122° F., averaging 107° F.

Dr. C. B. White filled a lamp with oil which had a gravity of 45° B., flashed at 90° F. and took fire at 110°. After the lamp had burned two hours, he purposely permitted it to fall and be broken, when the whole mass of oil instantly took fire. Yet, this sample had a flashing point three and four-tenths degrees higher than the average of these eighty-five samples.

It seems, therefore, that there is no essential improvement in the character of the oils sold in New York. While the percentage of safe kerosenes is higher, the percentage of naphtha has also increased. The evil can only be eluded by a well conceived State law, which shall make it a misdemeanor to sell or keep for sale, for illuminating purposes, any coal oil or petroleum product that evolves a combustible vapor below 100° F.

EFFORTS OF THE BOARD OF HEALTH TO PROTECT THE PUBLIC FROM DANGEROUS OILS.

As early as 1868 the attention of the Board of Health was directed to this subject. An elaborate investigation was made, to ascertain the quality of the oils sold in the Metropolitan district. This examination showed that the oils sold in New York were of the poorest quality. Of 636 samples tested, only 21 were found to be safe. In consequence of this discovery the Board adopted the following ordinance:

"No petroleum oil, kerosene oil, or other liquid having like composition or qualities as a burning fluid as said oil, shall be kept or offered for sale as a burning fluid, for lamps or any like receptacle, for the purpose of illumination, nor shall such oil or fluid be purchased for use, or be used as a burning fluid for any such lamp or receptacle, or be kept for such use, unless all such oil or fluid shall be of such quality and ingredients that it shall stand and be equal to both the following tests and conditions, to wit:

"1. That it shall not take fire or burn at a temperature below 110° Fahr

"2. That it shall not evolve an explosive vapor below 100° Fahr."

Under this ordinance the attorney of the Board was directed to commence suits against those who were found to sell oil below the standards of safety fixed by the Board. About one hundred cases were made out and tried in the Sixth District Court, but were dismissed on the ground that the Board of Health had no authority to pass the ordinance.

Not succeeding in enforcing the ordinance here, the cases were carried to a higher court. In this position they became a legacy to the attorney of the new Health Department of the City of New York, and under his direction they were pushed until a decision was rendered at General Term of the Court of Common Pleas, sustaining the court below. The following is the report of the case:

DECISION DENYING THE AUTHORITY OF THE BOARD OF HEALTH TO PASS THE KEROSENE ORDINANCE.

A decision was rendered at the General Term of the Court of Common Pleas yesterday on an appeal from a judgment of the Sixth District Court, in the case of the Metropolitan Board of Health *v.* M. Schmaales. This action was brought by the plaintiffs to recover a penalty of $50 for an alleged violation of an ordinance passed by them on the 25th January, 1869, and which is in the following words, to wit:

"That no petroleum oil, kerosene oil, or other liquid (having like composition or qualities as a burning fluid as said oil), shall be kept or offered for sale as a burning fluid for lamps, or in any receptacle for the purpose of illumination; nor shall such oil or fluid be purchased for use, or be used as a burning fluid for any such lamp or receptacle, or be kept for such use, unless all such oil or fluid shall be of such quality and ingredients that it shall stand and be equal to both the following tests and conditions, to wit:

"1. That it shall not take fire or burn at a temperature below 110° Fahrenheit; and

"2. That it shall not evolve an explosive vapor at a temperature below 100° Fahrenheit."

The defendant demurred to the complaint, on the ground that it did not set forth facts sufficient to constitute a cause of action. The Justice sustained the demurrer, and dismissed the complaint. The plaintiffs appealed to this court. George Bliss, Jr., for plaintiff and appellant; Cross, Rice & Holt, for defendant and respondent.

LOEW, J.—It appears that the complaint in this case was dismissed by the court below on the ground that the plaintiffs had no authority to pass the ordinance, for an alleged violation of which this action was brought. The power of the Board of Health to enact an ordinance like the one under consideration could not well be questioned

(Laws of 1866, chap. 74, secs. 12 and 20; id., chap. 686, secs. 1 and 3; Laws of 1867, chap. 956, sec. 10), were it not for other legislation respecting the storage and sale of kerosene or petroleum. In 1865 an act was passed by the Legislature (Laws 1865, chap. 773, sec. 3) prohibiting petroleum, kerosene, and other oils from being stored or sold within the corporate limits of any city in the State, "the fire-test of which shall be less than 100° Fahrenheit." On the 4th day of May of the following year, two other acts were passed (Laws of 1866, chap. 872, sec. 1, id. and chap. 873, sec. 51), one of which amends the act of 1865 and changes the prescribed test to 110° Fahrenheit, and the other enacts that "no refined petroleum, kerosene, earth or rock oil, or machinery oil, shall be kept upon sale or stored within the corporate limits of the city of New York, the fire-test of which shall be less than 100° Fahrenheit." Although both of these acts were passed on the same day, we think the last-mentioned one should be deemed the later and controlling statute, not only because its number is greater and because it was passed with special reference to the city of New York—while the former is applicable to all the cities in the State—but also for the reason that it was not to go into operation until the 1st day of June, 1866, whereas the other took effect immediately upon its passage. Effect will thus be given to both statutes in the city of New York, one being in force from the date of its passage to June 1, at which time the other went into effect and repealed all other statutes in any case provided for by that act or inconsistent with its provisions, so far as the same relate to said city (Laws 1866, chap. 873, sec. 62). As the Legislature has, in section 51 of the last-mentioned act, particularly specified what the fire-test of refined petroleum, kerosene, and other oils shall be, in order to render the storage and sale thereof lawful, and also prescribed the circumstances under, as well as the kind of buildings in which the same may be stored, we think it is not competent for the Board of Health to create or impose additional tests or conditions as a pre-requisite to the right to keep or sell such oil, as it has attempted to do in the ordinance referred to. The claim of the plaintiffs that said ordinance is consistent with the act of the Legislature, as the former only has reference to the keeping and offering for sale petroleum which is to be used as a burning fluid, or for the purpose of illumination, while the latter relates to the storage and sale thereof generally, will not avail them. The act of the Legislature prohibits the storage or sale of petroleum that does not come up to a certain test, which implies that it may be so stored and sold if it be of that test. Now the ordinance of the Board of Health prescribes another and different test, and forbids the keeping or selling thereof, notwithstanding the requirements of the law may be fulfilled. The two are, therefore, manifestly inconsistent with each other. Beside, a violation of the statute in respect to the test fixed by it, would necessarily also be a violation of the ordinance; and if the latter were valid, a party offending would be subjected to two actions to recover distinct penalties for the same cause—one brought by the Fire Department and the other by the Board of Health. Nor do we think that there is anything in section 10 of the act passed the year after the above law (Laws of 1867, chap. 956, sec. 10) which confers authority on the Board of Health to pass the ordinance in question. That section gives the Board power to make ordinances upon all matters and subjects so far as the power of said Board extends. But such ordinances must be consistent with the Constitution and laws of this State (Laws of 1866,

chap. 74, sec. 20; id., chap. 686, sec. 1), and, as we have already seen, the ordinance referred to is inconsistent with a law on the same subject, and is, therefore, invalid and of no effect. In our opinion the judgment of the court below was correct and should be affirmed.

Chief-Judge Daly and Judge Van Brunt concurred.

ACTION OF THE FIRE COMMISSIONERS.

Soon after the publication of the results of the investigations made by the officers of the Board of Health, the Fire Commissioners caused examinations to be made, the results of which fully confirmed our statements with regard to the dangerous character of the oil sold in New York. The Fire Commissioners also claimed that they alone had jurisdiction in the matter, as was afterward decided by the court. But it was found by them that the fire laws under which they acted would not enable them to prevent the sale of the dangerous oils. They have continued, however, to test oils, and in this manner do all that can be done under the law by diffusing a knowledge of the bad quality of the oils. Their standard of safety has, however, been ten to thirty degrees lower than that adopted by the Board of Health. The fire law, while it does not regulate the sale, defines the conditions on which oils may be stored in the city, and mentions a "fire test" of 100° Fahr. This was construed by the Fire Commissioners to refer to the "burning point," or the temperature at which the oil takes fire and continues to burn. In the ordinance of the Board of Health the "flashing point," a temperature at which the oil first gives off an inflammable vapor, was fixed at 100° Fahr. This accounts for an apparent discrepancy between the results obtained by them and by us.

The "flashing point" of an oil is generally from ten to thirty degrees lower than the "burning point," consequently their standard was so many degrees lower than ours. An oil which burns at 100° Fahr. may flash at 80° or 90° Fahr., while an oil which flashes at 100° will not burn below 110° to 125° Fahr.

During the year ending December 1, 1870, their Inspector, Mr. Elbert Robertson, had tested 2,750 samples, of which 2,446, or 89 per cent., did not take fire and burn at a temperature below 100° Fahr., and were, consequently, reported good. Nearly all of these, however, evolved an inflammable vapor at a temperature below 100° Fahr., and

were consequently unsafe, according to the standard adopted by the Board of Health ordinance. This latter is also the standard which is conventional among oil dealers (in theory, at least, though rarely reached in practice). It is also the legal standard in Great Britain. In the State of Ohio and in the city of New Orleans the standard is still higher, being 110° Fahr. for the flashing point, no regard being paid to the burning test.

As an officer of the Department of Health, I have been invited to visit the Bureau of Combustibles, where the tests are made for the Fire Commissioners, and to consult with their counsel, Col. T. Bailey Meyers, as to the best system for the suppression of the traffic in dangerous oils. An amended fire law for the city of New York, suggested by the Fire Commissioners, has been passed by the Legislature, and has, I believe, received the signature of the Governor.

I am sorry to see that some of the most important provisions of the bill have been stricken out during its passage through the Legislature, specially those which authorized a suit for actual damages to be brought against a party for selling oil below standard, and those which defined the death of a person from oil below the standard as manslaughter, the seller to be punished for this crime under the statutes.

ADVANTAGE OF THE INVESTIGATIONS.

While the Health Department has not been permitted to enforce the ordinance against unsafe oils, its work in this direction has been of the greatest importance to the country. It was the first systematic effort that was made to put a stop to the frightful accidents which had become so common, and which most people believed to be a necessary attendant upon the new light. We showed that this was not the case, and our facts and arguments have been made the basis of action in many different localities. The reports have appeared in chemical and medical journals in England, France, and Germany, as well as in many of the newspapers and journals in this country.

We are constantly receiving inquiries as to the best action to be taken to prevent the sale, or the best methods to be used in detecting the dangerous oils.

LAWS REGULATING THE SALE OF INFLAMMABLE OILS

The necessity of protecting the public from the ignorance or criminal cupidity of the dealers in dangerous kerosene and naphtha, has already led to the enactment of laws in many localities.

ENGLAND.

In England, as early as 1862, a law was enacted by Parliament regulating the safe-keeping of petroleum. This law fixes the test by pronouncing all oils dangerous which *give off* an *inflammable vapor at a temperature of less than one hundred degrees of Fahrenheit thermometer.*

In 1868, the act was amended, and a schedule of directions for applying the test was incorporated in the amended law.

A despatch from London, dated February 22, 1871, stated that, "in view of the many shocking accidents caused by petroleum, laws have been projected for subjecting it to still severer tests. A bill will soon be brought before Parliament looking to this end."

In June, 1871, a petroleum bill was passed consolidating and amending the previous enactments.

THE UNITED STATES CONGRESS.

A section in the Internal Revenue Act of March 2, 1867 (14 Statutes at Large, 484), relates to the subject of dangerous kerosene, benzine, etc.; it reads as follows:

ILLUMINATING OILS.

SECTION 29. *And be it further enacted*, That no person shall mix for sale naphtha and illuminating oils, or shall knowingly sell or keep for sale or offer for sale such mixture, or shall sell or offer for sale oil made from petroleum for illuminating purposes, inflammable at less temperature or fire test than 110° Fahrenheit, and any person so doing shall be held to be guilty of a misdemeanor, and on conviction thereof, by indictment or presentment, in any court of the United States having competent jurisdiction, shall be punished by a fine of not less than $100 nor

more than $500, and by imprisonment for a term of not less than six months nor more than three years.

In the case of the United States *v.* De Witt, the opinion was delivered by Chief-Justice Chase, that this section was merely a police regulation, relating exclusively to the internal trade of the States; and that accordingly it can only have effect when the legislative authority of Congress excludes, territorially, all State legislation, as for example in the District of Columbia. Within State limits it can have no Constitutional operation (9 Wallace, U. S. Reports, 1870, p. 41).

In January, 1869, Mr. Moorhead introduced a bill in the House of Representatives "To provide for the better security of life and property from the dangers of coal oil, crude petroleum and their products, and for other purposes." This bill did not pass, for the reason, I believe, that it was decided that the matter must be regulated by State or municipal authority.

In February, 1870, a general order was promulgated from the War Department, which provides that "hereafter no volatile oils will be issued or used for illuminating purposes at military posts, and all varieties of coal oil will be regarded as volatile. In general, lard oil will be supplied."

THE STATES.

The following States have already passed laws for the regulation of the sale, etc., of petroleum oils.

Maine, 1867.—The act provides for inspectors for all towns and cities with more than two thousand inhabitants; fixes the standard of safety at 120° F. Oils igniting or exploding below that temperature to be marked "unsafe." Penalty for selling oil below the standard, or which has not been inspected, a fine of not more than five hundred dollars, or imprisonment not to exceed six months. Prosecutions to be by indictment; the select-men of towns, and the mayor, aldermen, and police of cities to have the right to examine all oils and fluids kept for sale.

Vermont, 1868.—The act provides for inspectors, fixes the fire test at 110° F., forbids the sale of oils below this standard under penalty of a fine of $100, or imprisonment not to exceed one month, or both; makes the seller liable for any damage resulting from oil unlawfully sold; the

unsafe oil to be confiscated; village, town, or city officers to prosecute offenders.

Massachusetts, 1869.—The act provides for inspectors for towns and cities with more than 1,500 inhabitants, fixes flashing point of safe oil at 100° F., and igniting point at 110° F.; fixes penalty at fine not to exceed $100, or imprisonment not to exceed one month, or both; makes seller of oil below standard liable for damages resulting from explosion or ignition of unsafe oil, forbids all oil below standard, brands all oils below standard "unsafe," requires all petroleum products to be inspected, regulates storage, etc.

Rhode Island, 1871.—The act forbids selling or keeping for sale oil, etc., which flash or inflame at a temperature below 110° F., provides for inspection, for branding fire test on package, fixes the penalty for violation of the act at a fine not to exceed $500, or imprisonment not to exceed six months. This act does not prevent the regulation of the subject by city or town ordinances, and provides that the act shall not apply to oils already inspected under such ordinances.

The city of Providence has its own local ordinances on the same subject, adopting the same standard of safety, but limiting penalty to not more than $200, or imprisonment not longer than six months.

Pennsylvania, 1865.—An act for the better security of Philadelphia, etc. This act relates entirely to the manufacture and storage of petroleum products, without reference to quality.

1868.—This act regulates the sale of refined petroleum, kerosene, etc., in the city and county of Philadelphia. It provides for inspection, and fixes the fire test at 110° F. The penalty for selling oil which has not been inspected or which is below the standard is a fine of not more than $500, or imprisonment for not more than one year; the oils to be at the same time forfeited.

1868. An act extending the provisions of the last act to the counties of Montgomery and Schuylkill.

1869. An act to authorize the Governor to appoint an inspector of oils for the county of Lancaster.

1870. An act to limit the inspection in Lancaster county to oils which are to be sold there, etc.

Maryland, 1871.—This act fixes the standard of safety at 110° F. for the burning test, and requires the stamping of the quality on the

package, under penalty of confiscation. In case of accident from oil below the standard, the seller may be fined or imprisoned, or both, at the discretion of the court. Gasolene is excepted from the provisions of the act.

Ohio, 1867.—The act provides for the inspection of oil, and branding of the packages as "rejected for illuminating purposes" when the oil is below the standard.

The penalty for selling oils which have not been inspected, or which have been rejected as unsafe, is a fine not to exceed five hundred dollars, or imprisonment for not more than six months, or both. Any person who shall violate or neglect any of the provisions of the act may be liable for any damages sustained by the ignition of the oil, and in case a death result shall be punished for manslaughter.

Illinois, 1869.—The act provides for the appointment of inspectors, the testing of oils, and branding of the packages as "approved" or "condemned," with the actual fire test. The standard is fixed at 110° F., at which temperature the oil shall not ignite or explode. The penalty for selling oils which have not been inspected, or which are below the standard, is a fine of not more than one hundred dollars, or imprisonment for not more than one month, or both. The seller of unsafe oil is made liable for any damages which may result from an explosion or fire.

The Board of Health of Chicago passed an ordinance in 1870, making it unlawful to sell any oil, kerosene, petroleum, burning fluid, or other fluid for illuminating purposes, without attaching to the package or can *a caution*, in which persons are warned not to use the oil for lighting fires, not to fill the lamp while burning, etc. The ordinance also required every dealer in illuminating oils to register his name and place of business with the Board. The penalty for violating the ordinance being a fine from five to five hundred dollars.

Indiana, 1863.—The act provides for the inspection of oils and branding of packages as "approved" or "rejected." The standard is fixed at 100° F. for the flashing point of the oil. The penalty for violating the act is a fine of from $100 to $500, or imprisonment not to exceed six months, or both.

Georgia, 1870.—The act fixes the "fire test" at 110° F. The penalty for selling oil below this standard is from $100 to $500, one-half

the fine to go to the informer, one-fourth to the inspector, one-fourth to the county treasury.

Michigan, 1869.—The act provides for the appointment of inspectors for each county. It fixes the standard of safety at 110° F. for the flashing test, and makes the penalty for selling oil below this standard a fine not to exceed five hundred dollars. In 1871 this act was amended, its essential features being, however, preserved.

Missouri, 1870.—The act provides for the appointment of inspectors for cities and towns, fixes the standard of safety at 100° F. for the burning test, requires the quality of oils to be branded upon the packages, and makes the penalty for selling oil which has not been inspected a fine not to exceed three hundred dollars.

Louisiana.—The Board of Health of New Orleans has been most active in its efforts to break up the traffic in dangerous illuminating oils. During the year 1869 there were fifty deaths in the city from burns, mostly by kerosene and other oils. Early in 1870 an ordinance was passed making it unlawful to sell oils which would not stand a flashing test of 110° F., and a burning test of 120° F. This was subsequently amended so as to require every package of oil sold to be marked with the quality and name of seller, etc. The penalty for violating the ordinance was fixed at fifty dollars.

To bring the matter home to every citizen, the Board issued a short circular containing the amended ordinance, and a few statements with regard to dangerous oils, which was distributed throughout the city.

The Board also prepared a draft of a State law for regulating the sale of petroleum oils, though I do not know whether it has been as yet enacted. This act has some features not contained in any of the State acts already mentioned. It fixes the flashing point of 110° F. as the standard of safety; provides for the inspection and branding of packages; fixes the penalty for selling *kerosene oil* below the standard, or which has not been inspected, at not to exceed two hundred dollars; fixes the penalty for selling *benzine*, *naphtha*, or *gasolene*, as illuminating oil, at five dollars to five hundred dollars; and provides that persons may be restrained by injunction during the progress of any suit under this act, from doing or suffering to be done any of the acts on account of which such action is brought.

[OFFICIAL.]

CIRCULAR ISSUED TO THE CITIZENS OF NEW ORLEANS.

Board of Health and Coal Oils.

OFFICE BOARD OF HEALTH, STATE OF LOUISIANA,
NEW ORLEANS, July 2, 1870.

Whereas, The frequency of accidents from the use of oils and fluids produced from coal and petroleum, has rendered it necessary, in the belief of the Board of Health, that the public should be advised as to which of said oils and fluids it deems *dangerous* for common use, and which it considers *safe;* and thus, as far as possible, protect the citizen, the said Board publishes: That it considers no such oil or fluid safe whose flashing point is below 110 degrees Fahrenheit; that is, that no such oil or fluid which gives off an inflammable gas or vapor at a lower temperature than 110 degrees Fahrenheit is safe from explosion, or from its readiness to take fire. There are many such oils and fluids which are inflammable at all temperatures, and this Board considers such oils and fluids dangerous, principally and specially from their excessive inflammability, while explosions from such highly inflammable oils and fluids occur infrequently. Such oils or fluids as these, if used at all, should be used with great care and never be left in the hands of children; nor should they be used except in metallic lamps. These oils and fluids are generally, unless artificially colored, without color, and look like water. These are the lighter products of coal and petroleum.

Between these highly inflammable oils and fluids and the safe oils is another class of oils or fluids, generally of a yellowish color, dangerous both from their inflammability and liability to explosion. These classes include a very large proportion of all the oils and fluids sold in our markets, and the public is cautioned to avoid the use of them entirely. All lamps should be filled every day, by daylight. Most explosions occur when the lamp is but partly filled.

While this Board has adopted the "flashing point 110 degrees Fahrenheit," as the lowest standard practically safe from most ordinary accidents, it does not wish to be understood to imply that even with oils or fluids at or above the standard great care or caution should not be used. It is however the standard adopted by several of the States. The Board specially cautions the public against the use of oil or fluid, produced from coal or petroleum, which is marked below "Board of Health standard flashing point" 110 degrees.

Of the eleven accidents officially reported upon to the Board of Health since May 26, three were caused by oils liable both to take fire and explode; and eight were caused by fluids of the class dangerous by reason of excessive inflammability.

C. B. WHITE, M.D.,
President.

S. C. RUSSELL, M.D., *Secretary.*

OFFICE OF BOARD OF HEALTH
No. 138 LOCAL STREET, NEW ORLEANS,
July 1, 1878

At a meeting of the Board of Health of the State of Louisiana, held on Friday the 1st day of July, 1878, it was

Resolved, That section twenty-two of the sanitary ordinance, adopted by this Board on the 10th day of May, 1878, be amended and re-enacted so as to read as follows:

SEC. 22. It shall hereafter be unlawful for any person or persons, firm or corporation, to sell, give or deliver, except as common carrier, any kerosene oil or other illuminating oil or oils, or any illuminating fluid or fluids, derived wholly or in part from coal or petroleum, except in the manner hereinafter specified; that is, if the quantity so sold, given or delivered, shall exceed five gallons in amount, the person or persons, firm or corporation, making such sale, gift or delivery, shall, before actual delivery thereof, place or cause to be placed, such oil or oils, fluid or fluids, in tin or other metallic vessels, which shall be thoroughly tight and secure; and if however, the quantity so sold, given or delivered, shall not exceed five gallons in amount, the person or persons, firm or corporation, making such sale, gift or delivery, shall, before actual delivery thereof, place or cause to be placed, such oil or oils, fluid or fluids, in tin or other metallic vessels, which shall be thoroughly tight and secure; and any person or persons, firm or corporation, making any such sale, gift or delivery, except as a common carrier, shall, before actual delivery thereof, whatever the amount of such sale, gift or delivery may be, attach or cause to be attached securely to the cask or vessel containing such oil or oils, fluid or fluids so sold, given or to be delivered, a card, label or tag, upon which shall be printed in plain type, not less than three-eighths of an inch in length, the correct name and brand of such oil or oils, fluid or fluids, in such cask or vessel contained; also the words and figures following: "Inflammable at — degrees, Fahrenheit," naming the degrees, or "Inflammable at any temperature," as the case may be; also the words and figures following: "Explosive at — degrees," naming the degrees, or "non-explosive," as the case may be; also, the words following: "Board of Health standard boiling point, 111 degrees." There shall also be upon said card, label or tag the name of the person or persons, firm or corporation, making such sale, gift or delivery, with the street and number where such person or persons, firm or corporation, has business. Any person or persons, firm or corporation, making any sale, gift or delivery of any such oil or oils, fluid or fluids, otherwise than hereinbefore specified, shall be liable to a penalty not exceeding fifty dollars, and any person or persons, firm or corporation neglecting or failing to attach or cause to be attached securely to the cask or vessel containing any such oil or oils, fluid or fluids, the card, label or tag as aforesaid, or to place thereon the words and figures, as hereinbefore specified, shall be liable to a penalty not exceeding fifty dollars, and any person or persons, firm or corporation, who shall attach or suffer to be attached to any such cask or vessel any card, label or tag which shall not be, in all respects, a true representation of the contents of such cask or vessel, or which shall not be true in every respect, shall be liable to a penalty of fifty dollars. The acts and things of employés of any person or persons, firm or corporation, in all the matters and

things referred to in this section, shall be considered as the acts and doings of such person or persons, firm or corporation. This section shall not be construed as applicable to actual sales, gifts or deliveries of oil or oils, fluid or fluids, to be shipped beyond the territory included in the district under the sanitary control of the Board of Health.

C. B. WHITE, M.D.,
President.

S. C. RUSSELL, M.D., *Secretary.*

New York, 1865.—Chapter 773, of the laws of this year, regulates the storage of petroleum, etc., in cities. The act says no refined petroleum shall be kept on sale or stored in any city, the fire test of which is below 100° F. It orders the inspection and stamping of barrels, fixes the penalty of violating the act from $50 to $500, requires mayor and councils to pass ordinances enforcing the act, authorizes the Inspector of Buildings of New York City to appoint three inspectors, and to prosecute offenders, etc. The Fire Marshal's bill, passed at the last session of 1871, is presented further on.

This act is limited in its action to the city of New York. It fixes a flashing point of 100° F. as the standard of safety; provides for licensing all dealers in illuminating oils, and makes the penalty for selling oils below the standard at $50.

While the city of New York is protected to a certain extent by this act, the rest of the State is still at the mercy of the venders of unsafe kerosene and naphtha.

STATES STILL WITHOUT LEGISLATION ON DANGEROUS OILS.

The Secretaries of the following States inform me that no laws have yet been enacted by their respective legislatures on this subject:

New Jersey, Delaware, Virginia, West Virginia, South Carolina, Alabama, Florida, Louisiana, Tennessee, Mississippi, Arkansas, Wisconsin, Iowa, Minnesota, Nebraska, Kansas, Texas, Nevada, California, Oregon. To this list should be added New York, as the present laws are very imperfect or local.

STATES IN WHICH LAWS ALREADY EXIST WITH REGARD TO DANGEROUS OILS.

The following States have already enacted laws to regulate the sale of dangerous oils: Maine, Vermont, Massachusetts, Rhode Island, Pennsylvania, Maryland, Ohio, Illinois, Indiana, Georgia, Michigan, Missouri.

STATES NOT HEARD FROM.

New Hampshire, Connecticut, North Carolina, and Kentucky.

WHAT ACTION IS NECESSARY TO PROTECT THE PUBLIC FROM DANGEROUS OILS.

First.—The public must be educated to a proper understanding o the properties of petroleum and its products. The facts must be dis seminated in every possible way. The most effective agents will, o course, be the newspapers, but in every city, town, and village, the au thorities should issue short and clear statements in the form of circulars This was done in New Orleans with excellent results. When the peo ple are fully informed on the subject they will not purchase dangerous oils, and the venders of naphtha will go out of business for want o customers.

Second.—The Legislature of each State should pass a stringent law with severe penalties, to regulate the sale of petroleum products.

The following copies of the laws already alluded to are given t serve as guides in framing proper acts for regulating the sale of petro leum and coal oils:

ENGLAND.

AN ACT for the safe-keeping of petroleum.—(29th July, 1862.)

WHEREAS, it is expedient to provide for the safe-keeping of petroleum and certain pro ducts thereof that are dangerous to life and property, from their properties of giving off inflammable vapors at low temperature: *Be it enacted* by the Queen's most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

1. "Petroleum," for the purposes of this act, shall include any product thereof that gives off an inflammable vapor at a temperature of less than one hundred degrees of Fahrenheit's thermometer.

"Borough" shall in England mean any place for the time being subject to the provisions of the act of the session holden in the fifth and sixth years of King William the Fourth, chapter seventy-six, entitled An Act to Provide for the Regulation of Municipal Corporations in England and Wales; and in Scotland any royal burgh and any of the burghs or towns returning or contributing to return members to Parliament; and in Ireland any place for the time being subject to the provisions of the act of the session holden in the third and fourth years of Her Majesty, chapter one hundred and eight, entitled An Act for the Regulation of Municipal Corporations in Ireland.

"Harbor" shall include any port, dock, navigable river, pier, or other works in or at which vessels ship or discharge goods or passengers.

"Harbor authority" shall include all persons, or bodies of persons, corporate or unincorporate, being proprietors of or entrusted with the duty of improving, maintaining, or managing any harbor.

2. Every vessel carrying a cargo consisting wholly or in part of petroleum, on entering any harbor within the United Kingdom, shall conform to such regulations in respect to the place at which she is to be moored as may from time to time be issued by the harbor authority having jurisdiction over such harbor. If any vessel is moored in any place in contravention of such regulations, the owner or master of such vessel shall incur a penalty not exceeding twenty pounds for each day during which the vessel remains moored, and it shall be lawful for the harbor master, or any other person acting under the orders of the harbor authority, to cause such vessel to be removed, at the expense of the owner thereof, to such place as may be in conformity with the said regulations, and all expenses incurred in such removal may be recovered in the same manner in which penalties are hereby made recoverable.

3. From and after the first day of October, one thousand eight hundred and sixty-two, not more than forty gallons of petroleum shall be kept within fifty yards of a dwelling house, or of a building in which goods are stored, except in pursuance of a license given by such local authority as is hereinafter mentioned.

Any petroleum kept in contravention of this section shall be forfeited, and, in addition thereto, the occupier of the place in which such petroleum is kept shall incur a penalty not exceeding twenty pounds a day for each day during which petroleum is kept in contravention of this act.

4. The following bodies shall respectively be the local authority to grant licenses under this act in the districts hereinafter mentioned (that is to say),

1. In the city of London, except as hereinafter mentioned, the Court of Lord Mayor and Aldermen of the said city.
2. In the metropolis, as defined by the act of the session of the eighteenth and nineteenth years of the reign of Her present Majesty, chapter one hundred and twenty, except the city of London, and except as hereinafter mentioned, the Metropolitan Board of Works.
3. In any borough in England or Ireland, except as hereinafter mentioned, the Mayor, Aldermen, and Burgesses, by the council.
4. In any place in England or Ireland, except as hereinafter mentioned, within the jurisdiction of any trustees or improvement commissioners, appointed under the provisions of any local or general act of Parliament, the trustees or commissioners.
5. In any burgh or place in Scotland, except as hereinafter mentioned, within the jurisdiction of any town council, and not subject to the jurisdiction of police commissioners or trustees, the town council; but in any burgh or place in Scotland, except as hereinafter mentioned, within the jurisdiction of police commissioners, or trustees exercising the functions of police commissioners under any general or local act, the police commissioners or trustees.

6. In any harbor within the jurisdiction of a harbor authority, whether situate o not within the jurisdiction of any local authority hereinbefore mentioned, th harbor authority to the exclusion of any other local authority.

7. In any place in England or Ireland in which there is no local authority as herei before defined, the justices in petty sessions assembled, and in Scotland any tw justices of the peace for the county.

5. Licenses in pursuance of this act shall be valid if signed by two or more of th persons constituting the local authority, or executed in any other way in which othe licenses, if any, granted by such authority, are executed; they may be granted for a limited time, and there may be annexed thereto any conditions as to renewal or other wise which the local authority thinks necessary for diminishing the risk of damag from explosion or fire; and any licensee violating any of the conditions of his licens shall be deemed to be an unlicensed person.

6. If, on any application for a license under this act, the local authority refuses th license, or grants the same only on conditions with which the applicant is dissatisfied, the local authority shall, if required by the applicant, certify in writing under the hand or hands of one or more of the persons constituting the local authority the grounds o which it refused the license or annexed conditions to the grant thereof, and shall deliver the certificate to the applicant, who may thereupon, within ten days from the time o the delivery thereof, transmit the same to one of Her Majesty's principal Secretaries o State, if the application is for a license in England or Scotland, and to the Lord Lieu tenant or other chief governor, if the application is for a license in Ireland, together with a memorial praying that, notwithstanding such refusal, the license may be granted or that such conditions may not be imposed, or may be altered or modified in such man ner and to such extent as may be set forth in such memorial; and it shall be lawful fo the Secretary of State, Lord Lieutenant, or other chief governor, if he think fit, o consideration of such memorial and certificate, and if he think it necessary or desirable after due inquiry from and a report by such person as he may appoint for that purpose to grant the license prayed for, either absolutely, or with such conditions as he think fit, or to alter or modify the conditions imposed by the local authority; and the licens so granted, or altered and modified, as the case may be, when certified under the hand of the said Secretary of State, Lord Lieutenant, or other chief governor, shall be to al intents as valid as if granted by the local authority.

7. Any forfeiture or penalty for an offence against this act may be enforced in Eng land and Ireland upon summary conviction before any two justices; and one moiety of the forfeiture and penalty shall belong to Her Majesty, and the other moiety to the informer, unless the informer is a servant of the person informed against, in which case the moiety of the forfeiture or penalty which would otherwise belong to the informer shall be applied in such manner and to such other purposes as the justices in their or his discretion may think fit.

8. Any forfeiture or penally for an offence against this act may be enforced in Scot land upon summary conviction, at the instance of the procurator fiscal, before any sheriff, or before any two justices of the county, or before the magistrates or any police magistrate of the burgh in which the offence was committed, who may sentence the offender to imprisonment, until such forfeiture or penalty and the expenses of conviction

are paid, for a period not exceeding three months; and one moiety of such forfeiture or penalty shall belong to Her Majesty, and the other moiety shall be applied in such manner and to such purposes as such sheriff, justices, magistrates, or magistrate, in their or his discretion may think fit.

9. Petroleum may be searched for in the same manner, under the same warrants, and subject to the same conditions in, under, and subject to which gunpowder may be searched for, in pursuance of the act passed in the session holden in the twenty-third and twenty-fourth years of the reign of Her present Majesty, chapter one hundred and thirty-nine; and all the provisions of the said act relating to searching for gunpowder shall be incorporated with this act, and be construed as if the word "gunpowder" in such provisions included petroleum as defined by this act, and as if the act therein referred to were this act.

10. All powers given by this act shall be deemed to be in addition to and not in derogation of any other powers conferred on any local authority by act of Parliament, law, or custom; and the local authority may exercise such other powers in the same manner as if this act had not passed; and nothing in this act contained shall be deemed to exempt any person from any penalty to which he would otherwise be subject in respect of a nuisance.

AN ACT to amend the Act twenty-fifth and twenty-sixth Victoria, chapter sixty-six, for the safe keeping of petroleum.—(13th July, 1868.)

WHEREAS, it is expedient to make further provisions for the safe keeping of petroleum and other substances of like nature.

Be it enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

1. This act may be cited for all purposes as "The Petroleum Act, 1868."

2. This act, so far as is consistent with the tenor thereof, shall be read as one with the act of the session holden in the twenty-fifth and twenty-six years of the reign of Her present Majesty, chapter sixty-six, intituled an act for the safe keeping of petroleum, and the said act may be cited for all purposes as "The Petroleum Act, 1862," and this act and the said act may be cited together as "The Petroleum Acts, 1862, 1868."

3. For the purposes of the petroleum acts, 1862, 1868, including all local acts and by-laws relating to petroleum or the produce thereof, "petroleum" shall include all such rock oil, Rangoon oil, Burmah oil, any product of them, and any oil made from petroleum, coal, schist, shale, peat, or other bituminous substance, and any product of them, as gives off an inflammable vapor at a temperature of less than one hundred degrees of Fahrenheit's thermometer.

4. From and after the first day of February, one thousand eight hundred and sixty-nine, the third section of the petroleum act, 1862, shall be repealed; provided that such repeal shall not affect any liability or penalty incurred in respect of any offence committed before the passing of this act, or any legal remedy for enforcing or recovering such liability or penalty.

From and after the first day of February, one thousand eight hundred and sixty-nine no petroleum shall be kept, otherwise than for private use, within fifty yards of a dwelling house or of a building in which goods are stored, except in pursuance of a license given in accordance with the petroleum act, 1862.

There may be annexed to any such license such conditions as to the mode of storing as to the nature of the goods with which petroleum may be stored, as to the taking such petroleum from time to time, and generally as to the safe keeping of petroleum as may seem expedient to the local authority.

Any petroleum kept in contravention of this section shall be forfeited, and in addition thereto the occupier of the place in which such petroleum is kept shall be liable to a penalty not exceeding twenty pounds a day for each day during which petroleum is kept in contravention of the petroleum acts, 1862 and 1868, or either of such acts.

5. No person shall sell or expose for sale for use within the United Kingdom any description of petroleum from and after the first day of February, one thousand eight hundred and sixty-nine, which gives off an inflammable vapor at a temperature of less than one hundred degrees of Fahrenheit's thermometer, unless the bottle or vessel containing such petroleum have attached thereto a label in legible characters stating as follows: "Great care must be taken in bringing any light near to the contents of this vessel, as they give off an inflammable vapor at a temperature of less than one hundred degrees of Fahrenheit's thermometer." Any person acting in contravention of this section shall for each offence be subject to a penalty not exceeding five pounds.

6. It shall be lawful for any Inspector of Weights and Measures, or other person or persons duly appointed to inspect weights and measures under the act twenty-second and twenty-third Victoria, chapter fifty-six, and the acts therein recited, at all reasonable times to inspect and test all petroleum kept, offered, or exposed for sale; and upon such inspection and test any description of petroleum shall be found kept or offered or exposed for sale as aforesaid contrary to the provisions of this act or of the petroleum act, 1862, the same shall be liable to be seized and, upon conviction, forfeited and such person so examining the same shall retain a sample thereof, and the person or persons so offending shall be liable for any such offence to any penalty not exceeding five pounds: provided always, that if the person or persons in whose possession such petroleum shall be found as aforesaid shall claim to have a further test made on their behalf the magistrate before whom complaint of the said offence may be laid shall call before him the public analyst provided by the second section of the act twenty-third and twenty-fourth Victoria, chapter eighty-four, or, if no such analyst has been provided some other person having competent chemical knowledge, who shall test a portion of the sample so retained as aforesaid in the manner hereinafter provided, and shall give evidence of the result of such test; and the magistrate shall direct payment to be made to the analyst of a sum not less than two shillings and sixpence nor more than ten shillings and sixpence; and in case of conviction the person convicted shall pay the cost of such analysis, and in case of acquittal such cost shall be paid in the manner provided for the payment of expenses by section twelve of the said act of the twenty-third and twenty-fourth Victoria.

7. All offences under the petroleum acts, 1862, 1868, may be tried as police offences by any magistrate acting under any general or local police act, and all forfeitures and

penalties incurred under the petroleum acts, 1862, 1868, may be disposed of, recovered, and applied in the manner authorized by such general or local police act.

8. The temperature at which petroleum gives off an inflammable vapor shall, for the purposes of the petroleum acts, be tested in manner set forth in the schedule hereto.

Schedule.

DIRECTIONS FOR APPLYING THE FLASHING TEST TO SAMPLES OF PETROLEUM OIL.

The vessel which is to hold the oil shall be of thin sheet iron; it shall be two inches deep and two inches wide at the opening, tapering slightly toward the bottom; it shall have a flat rim, with a raised edge one quarter of an inch high round the top; it shall be supported by this rim in a tin vessel four inches and a half deep and four and a half inches in diameter; it shall also have a thin wire stretched across the opening, which wire shall be so fixed to the edge of the vessel that it shall be a quarter of an inch above the surface of the flat rim. The thermometer to be used shall have a round bulb about half an inch in diameter, and is to be graduated upon the scale of Fahrenheit, every ten degrees occupying not less than half an inch upon the scale.

The inner vessel shall be filled with the petroleum to be tested, but care must be taken that the liquid does not cover the flat rim. The outer vessel shall be filled with cold, or nearly cold, water; a small flame shall be applied to the bottom of the outer vessel, and the thermometer shall be inserted into the oil so that the bulb shall be immersed about one and a half inches beneath the surface. A screen of pasteboard or wood shall be placed round the apparatus, and shall be of such dimensions as to surround it about two thirds, and to reach several inches above the level of the vessels.

When heat has been applied to the water until the thermometer has risen to about 90° Fahrenheit, a very small flame shall be quickly passed across the surface of the oil on a level with the wire. If no pale blue flicker or flash is produced, the application of the flame is to be repeated for every rise of two or three degrees in the thermometer. When the flashing point has been noted, the test shall be repeated with a fresh sample of the oil, using cold, or nearly cold water as before; withdrawing the source of heat from the outer vessel when the temperature approaches that noted in the first experiment, and applying the flame test at every rise of two degrees in the thermometer.

A BILL intituled An Act for the safe keeping of petroleum and other substances of a like nature.

WHEREAS, it is expedient to consolidate and amend the law relating to the safe keeping of petroleum and other substances of a like nature:

Be it enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

1. This act may be cited as "The Petroleum Act, 1871."

2. In this act, if not inconsistent with the context, the following terms have the meanings hereinafter assigned to them, that is to say:

The term "borough" means—

In England, any place for the time being subject to the provisions of the act of the session of the fifth and sixth years of the reign of King William the Fourth, chapter seventy-six, "to provide for the regulation of municipal corporations in England and Wales," and the acts amending the same;

In Scotland, any royal burgh and any burgh or town returning or contributing to return a member or members to serve in Parliament;

In Ireland, any place for the time being subject to the provisions of the act of the session of the third and fourth years of the reign of her present Majesty, chapter one hundred and eight, "for the regulation of municipal corporations in Ireland, and the acts amending the same;"

The term "person" includes a body corporate;

The term "Secretary of State" means one of her Majesty's principal Secretaries of State;

The term "Lord Lieutenant" means the Lord Lieutenant of Ireland or the lords justices or other chief governors or governor of Ireland for the time being;

The term "harbor" means any harbor properly so called, whether natural or artificial, and any port, haven, estuary, navigable river, dock, pier, jetty, or other works in or at which ships do or can ship or unship goods or passengers;

The term "harbor authority" includes any persons or person being or claiming to be proprietors or proprietor of or intrusted with the duty or invested with the power of improving, maintaining, or managing any harbor;

The term "ship" includes every description of vessel used in navigation, whether propelled by oars or otherwise;

The term "Summary Jurisdiction Acts" means as follows:

As to England, the act of the session of the eleventh and twelfth years of the reign of her present Majesty, chapter forty-three, intituled "An act to facilitate the performance of the duties of justices of the peace out of sessions within England and Wales with respect to summary convictions and orders," and any acts amending the same;

As to Scotland, "The Summary Procedure Act, 1864;"

As to Ireland, within the police district of Dublin metropolis, the acts regulating the powers and duties of justices of the peace for such district, or of the police of such district; and elsewhere in Ireland, "The Petty Sessions (Ireland) Act, 1851," and any act amending the same;

The term "Court of Summary Jurisdiction" means and includes any justice or justices of the peace, sheriff or sheriff substitute, metropolitan police magistrate, stipendiary or other magistrate, or officer, by whatever name called, to whom jurisdiction is given by The Summary Jurisdiction Acts or any acts therein referred to, or to proceedings before whom the provisions of The Summary Jurisdiction Acts are or may be made applicable;

The term "county rate" means as regards Scotland the county general assessment leviable in pursuance of "The County General Assessment (Scotland) Act, 1868."

3. For the purposes of this act the term "petroleum" includes any rock oil, Rangoon oil, Burmah oil, oil made from petroleum, coal, schist, shale, peat, or other bituminous

substance, and any products of petroleum, or any of the above-mentioned oils; and the term "petroleum, to which this act applies," means such of the petroleum so defined, as, when tested in manner set forth in schedule one to this act, gives off an inflammable vapor at a temperature of less than eighty-five degrees of Fahrenheit's thermometer.

4. Every harbor authority shall frame and submit for confirmation to the Board of Trade by-laws for regulating the place or places at which ships carrying petroleum to which this act applies are to be moored in the harbor over which such authority has jurisdiction, and are to land their cargo, and for regulating the time and mode of, and the precautions to be taken on, such landing. The harbor authority shall publish the by-laws so framed with a notice of the intention of such authority to apply for the confirmation thereof. The Board of Trade may confirm such by-laws with or without any omission, addition, or alteration, or may disallow the same.

Every such by-law when confirmed shall be published by the harbor authority, and may be from time to time altered or repealed by a by-law made in like manner. By-laws under this section shall be published in such manner as the Board of Trade may from time to time direct.

If at any time it appears to the Board of Trade that there is no by-law for the time being in force under this section in any harbor, the Board of Trade may, by notice, require the harbor authority of such harbor to frame and submit to them a by-law for the purposes of this section, and if such harbor authority make default in framing a by-law and obtaining the confirmation thereof within the time limited by such notice, the Board of Trade may make a by-law for the purposes of this section, and such by-law shall have the same effect as if it had been framed by the harbor authority and confirmed by the Board of Trade.

Where any ship or cargo is moored, landed, or otherwise dealt with in contravention of any by-law for the time being in force under this act in any harbor, the owner and master of such ship, or the owner of such cargo, as the case may be, shall each incur a penalty not exceeding fifty pounds for each day during which such contravention continues, and it shall be lawful for the harbor master, or any other person acting under the orders of the harbor authority of such harbor, to cause such ship or cargo to be removed, at the expense of the owner thereof, to such place as may be in conformity with the said by-law, and all expenses incurred in such removal may be recovered in the same manner in which penalties are by this act made recoverable.

5. The owner or master of every ship carrying a cargo consisting wholly or in part of petroleum, to which this act applies, on entering any harbor within the United Kingdom, shall give notice of the nature of such cargo to the harbor authority having jurisdiction over such harbor.

If such notice is not given, the owner and master of such ship shall each incur a penalty not exceeding the value of such ship and cargo.

6. Where any petroleum to which this act applies—

(*a*) Is kept at any place except during the seven days next after it has been imported; or

(*b*) Is sent or conveyed by land or water between any two places in the United Kingdom; or

(*c*) Is sold or exposed for sale;

the vessel containing such petroleum shall have attached thereto a label in conspicuous characters, stating the description of the petroleum, with the addition of the words "dangerously inflammable," and with the addition—

(*a*) In the case of a vessel kept, of the name and address of the consignee or owner;

(*b*) In the case of a vessel sent or conveyed, of the name and address of its sender;

(*c*) In the case of a vessel sold or exposed for sale, of the name and address of its vendor.

All petroleum to which this act applies which is kept, sent, conveyed, sold, or exposed for sale, in contravention of this section, shall, together with the vessel containing the same, be forfeited, and in addition thereto, the person keeping, sending, selling or exposing for sale the same, shall for each offence be liable to a penalty not exceeding five pounds.

7. Save as hereinafter mentioned, after the passing of this act, petroleum to which this act applies shall not be kept, except in pursuance of a license given by such local authority as is in this act mentioned.

All petroleum kept in contravention of this section shall, together with the vessel containing the same, be forfeited, and in addition thereto, the occupier of the place in which such petroleum is so kept shall be liable to a penalty not exceeding twenty pounds a day for each day during which such petroleum is so kept.

This section shall not apply to any petroleum kept either for private use or for sale, provided the following conditions are complied with:

1. *That it is kept in separate glass, earthenware, or metal vessels, each of which contains not more than half a pint, and is securely stopped;*

2. *That the aggregate amount kept, supposing the whole contents of the vessels to be in bulk, does not exceed three gallons.*

8. The following bodies shall respectively be the local authority to grant licenses under this act in the districts hereinafter mentioned; (this is to say),

1. In the city of London, except as hereafter in this section mentioned, the Court of the Lord Mayor and aldermen of the said city;

2. In the metropolis (that is in places for the time being within the jurisdiction of the Metropolitan Board of Works under "The Metropolis Management Act, 1855"), except the city of London, and except as hereafter in this section mentioned, the Metropolitan Board of Works;

3. In any borough in England or Ireland, except as hereafter in this section mentioned, the mayor, aldermen, and burgesses acting by the council;

4. In any place in England or Ireland, except as hereafter in this section mentioned, within the jurisdiction of any trustees or improvement commissioners, appointed under the provisions of any local or general Act of Parliament, and not being a borough, or comprising any part of a borough, the trustees or commissioners;

5. In any burgh in Scotland, except as hereafter in this section mentioned, the town council,

(6) In any place in Scotland, except as hereafter in this section mentioned, within the jurisdiction of police commissioners, or trustees exercising functions of police commissioners, under any general or local act, and not being a burgh, or comprising any part of a burgh, the police commissioners or trustees;

(7) In any harbor within the jurisdiction of a harbor authority, whether situate or not within the jurisdiction of any local authority before in this section mentioned, the harbor authority, to the exclusion of any other local authority;

(8) In any place in which there is no local authority as before in this section defined, in England or Ireland, the justices in petty sessions assembled, and in Scotland any two or more justices of the peace for the county, sitting as judges in the justice of peace court.

9. Licenses in pursuance of this act shall be valid, if signed by two or more of the persons constituting the local authority, or executed in any other way in which other licenses, if any, granted by such authority, are executed, Licenses may be granted for a limited time, and may be subject to renewal or not, in such manner as the local authority think necessary.

There may be annexed to any such license such conditions as to the mode of storage, the nature and situation of the premises in which, and the nature of the goods with which petroleum to which this act applies is to be stored, the facilities for the testing of such petroleum from time to time, the mode of carrying such petroleum within the district of the licensing authority, and generally as to the safe keeping of such petroleum as may seem expedient to the local authority.

Any licensee, violating any of the conditions of his license, shall be deemed to be an unlicensed person. There may be charged, in respect of each license granted in pursuance of this act, such sum, not exceeding five shillings, as the local authority may think fit to charge.

10. If, on any application for a license under this act, the local authority refuse the license, or grant the same only on conditions with which the applicant is dissatisfied, the local authority shall, if required by the applicant, deliver to him in writing, under the hand or hands of one or more of the persons constituting the local authority, a certificate of the grounds on which they refused the license or annexed conditions to the grant thereof.

The applicant, within ten days from the time of the delivery of the certificate, may transmit the same to a Secretary of State, if the application is for a license in England or Scotland, and to the Lord Lieutenant, if the application is for a license in Ireland, together with a memorial, praying that notwithstanding such refusal the license may be granted, or that the conditions may not be imposed, or may be altered or modified, in such manner and to such extent as may be set forth in such memorial.

It shall be lawful for the Secretary of State, or the Lord Lieutenant, if he think fit, on consideration of such memorial and certificate, and, if he think it necessary or desirable, after due inquiry, and a report by such person as he may appoint for that purpose, to grant the license prayed for, either absolutely or with such conditions as he thinks fit, or to alter or modify the conditions imposed by the local authority; and the license so granted, or altered and modified, as the case may be, when certified under the hand of

a Secretary of State, or the Lord Lieutenant, shall be to all intents as valid as if given by the local authority.

11. Any officer authorised by the local authority may purchase any petroleum by any dealer in it, or may, on producing a copy of his appointment, purporting to be certified by the clerk, or some member of the local authority, or producing some other sufficient authority, require the dealer to show him every or any place, and all or any of the vessels in which any petroleum in his possession is kept, and to give him samples of such petroleum on payment of the value of such samples.

When the officer has, by either of the means aforesaid, taken samples of petroleum, he may declare in writing to the dealer that he is about to test the same, or cause the same to be tested, in manner provided by this act, and it shall be lawful for him to test the same, or cause the same to be tested, at any convenient place, at such reasonable time as he may appoint, and the dealer, or any person appointed by him, may be present at the testing, and if it appear to the officer or other person so testing, that the petroleum from which such samples have been taken is petroleum to which this act applies, such officer or other person may certify such fact, and the certificates so given shall be receivable as evidence in any proceedings that may be taken against a dealer in petroleum in pursuance of this act: but it shall be lawful for a dealer proceeded against to give evidence in proof that such certificate is incorrect, and thereupon the court before which any such proceedings may be taken, may, if such court think fit, appoint some person skilled in testing petroleum to examine the samples to which such certificate relates, and to declare whether such certificate is correct or incorrect.

Any expenses incurred in testing any petroleum of such dealer, in pursuance of this section, shall, if such dealer be convicted of keeping, sending, conveying, selling or exposing for sale petroleum, in contravention of this act, be deemed to be a portion of the costs of the proceedings against him, and shall be paid by him accordingly. In any other event such expenses shall be paid by the local authority, out of any funds for the time being in their hands, and, in case the local authority are the justices, out of the county rate, as part of the expenses of such justices.

12. Any dealer who refuses to show to any officer authorised by the local authority every or any place, or all or any of the vessels in which petroleum in his possession is kept, or to give him such assistance as he may require for examining the same, or to give to such officer samples of such petroleum, on payment of the value of such samples, or who wilfully obstructs the local authority, or any officer of the local authority, in the execution of this act, shall incur a penalty not exceeding twenty pounds.

13. Where any court of summary jurisdiction is satisfied by information on oath that there is reasonable ground to believe that any petroleum to which this act applies, is being kept, sent, conveyed, or exposed for sale within the jurisdiction of such court, in contravention of this act, at any place, whether a building or not, or in any ship or vessel, such court shall grant a warrant, by virtue whereof it shall be lawful for any person named in such warrant to enter the place, ship, or vessel named in such warrant, and every part thereof, and examine the same and search for petroleum therein, and take samples of any petroleum found therein, and if any petroleum to which this act applies be found therein, which is kept, sent, conveyed, or exposed for sale, in contravention of this act, to seize and remove such petroleum, and the vessel containing the same, and

to detain such petroleum and vessel until some court of summary jurisdiction has determined whether the same are or not forfeited, the proceedings for which forfeiture shall be commenced forthwith after the seizure.

Any person seizing any petroleum to which this act applies, in pursuance of this section, shall not be liable to any suit for detaining the same, or for any loss or damage incurred in respect of such petroleum, otherwise than by any wilful act or neglect while the same is so detained.

If any petroleum to which this act applies is seized in pursuance of this section in any ship or vehicle, the person seizing the same may use for the purposes of the removal thereof, during twenty-four hours after the seizure, the said ship or vehicle, with the tackle, beasts, and accoutrements belonging thereto, and, if he do so, shall pay to the owner thereof a reasonable recompense for the use thereof, and the amount of such recompense shall, in case of dispute, be settled by the court of summary jurisdiction before whom proceedings for the forfeiture are taken, and may be recovered in like manner as penalties under this act may be recovered.

Any person who, by himself or by any one in his employ or acting by his direction or with his consent, refuses or fails to admit into any place occupied by or under the control of such person, any person demanding to enter in pursuance of this section, or in any way obstructs or prevents any person in or from making any such search, examination, or seizure, or taking any such samples as authorized by this section, shall be liable to pay a penalty not exceeding twenty pounds, and to forfeit all petroleum to which this act applies which is found in his possession or under his control.

14. Her Majesty may from time to time make, revoke, and vary orders in council directing this act or any part thereof to apply to any substance, and this act, or the part thereof specified in the order shall, during the continuance of the order, apply to such substance, and shall be construed and have effect as if throughout it such substance had been included in the definition of petroleum to which this act applies, subject to the following qualifications:

(1) The quantity of any substance to which this act is directed by order in council to apply, which may be kept without a license, shall be such quantity only as is specified in that behalf in such order, or if no such quantity is specified no quantity may be kept without a license;

(2) The label on the vessel containing such substance shall be such as may be specified in that behalf in the order.

15. All offences and penalties under this act, and all money and expenses by this act directed to be recovered as penalties, shall be prosecuted and recovered under the provisions of the Summary Jurisdiction Acts before a court of summary jurisdiction, and all necessary powers and jurisdictions are hereby conferred on such court in Scotland.

Provided as follows:

1. A court of summary jurisdiction shall not impose a penalty exceeding fifty pounds, but any such court may impose that or any less penalty for any one offence, notwithstanding the offence involves a penalty of higher amount.
2. The "Court of Summary Jurisdiction," when hearing and determining an information or complaint, shall be constituted in some one of the following manners; that is to say—

(*a*) In England, either of two or more justices of the peace in petty sessions sitting at a place appointed for holding petty sessions, or of one of the magistrates hereinafter mentioned, sitting alone or with others at some court or other place appointed for the administration of justice; that is to say, the Lord Mayor or any alderman of the city of London, a metropolitan police magistrate, a stipendiary magistrate, or some other officer or officers for the time being empowered by law to do alone or with others any act authorized to be done by more than one justice of the peace.

(*b*) In Scotland, of two or more justices of the peace sitting as judges in a justice of the peace court, or of one of the magistrates hereinafter mentioned sitting alone or with others at some court or other place appointed for the administration of justice; that is to say, the sheriff of the county or his substitute, or the provost or other magistrate of a royal burgh, or some other officer or officers for the time being empowered by law to do alone or with others any act authorized to be done by more than one justice of the peace.

(*c*) In Ireland, within the police district of Dublin metropolis, one of the divisional justices of the police district of Dublin metropolis, and elsewhere of two or more justices of the peace in petty sessions, sitting at a place appointed for holding petty sessions.

8. The description of any offence under this act in the words of such act shall be sufficient in law.

4. Any exception, exemption, proviso, excuse or qualification, whether it does or not accompany the description of the offence in this act, may be proved by the defendant, but need not be specified or negatived in the information; and if so specified or negatived, no proof in relation to the matters so specified or negatived shall be required on the part of the informant or prosecutor.

5. No conviction or order made in pursuance of this act shall be quashed for want of form or be removed by certiorari or otherwise, either at the instance of the crown or of any private party, into any superior court. Moreover, no warrant of commitment shall be held void by reason of any defect therein, provided that there is a valid conviction to maintain such warrant, and it is alleged in the warrant that the party has been convicted.

6. All forfeitures may be sold or otherwise disposed of in such manner as the court may direct.

16. All powers given by this act shall be deemed to be in addition to and not in derogation of any other powers conferred on any local or harbor authority by Act of Parliament, law, or custom, and every local authority and harbor authority may exercise such other powers in the same manner as if this act had not passed; and nothing in this act contained shall be deemed to exempt any person from any penalty to which he would otherwise be subject in respect of a nuisance.

17. The acts mentioned in schedule two to this act are hereby repealed to the extent in that schedule mentioned.

Provided that such repeal shall not affect any order in council made, or any license granted, under any act hereby repealed or any liability or penalty incurred in respect of any offence committed before the passing of this act, or any remedy or proceeding for

enforcing such liability or penalty, and every such order, so far as relates to the matters provided for by this act, and every such license shall have effect as if it had been made or granted under this act.

Schedules.

SCHEDULE ONE.

DIRECTIONS FOR TESTING PETROLEUM TO ASCERTAIN THE TEMPERATURE AT WHICH IT GIVES OFF INFLAMMABLE VAPOR.

The apparatus to be employed in this test shall consist of—

(*a*) An outer vessel of metal to contain water, about four inches in diameter and four inches deep, so contrived that some source of heat, such as a spirit lamp or gas burner, can be applied to it to heat the water which it contains:

(*b*) An inner vessel of thin metal to contain the petroleum to be tested, about two inches in diameter and two inches deep, provided with an external rim or flange, above which the edge of the vessel shall rise about one-fourth of an inch, and by which it may be supported in the outer vessel so that its contents may be heated through the medium of the water.

The inner vessel for the petroleum shall be provided with a cover of thin metal fitting to the edge which rises above the rim or flange already described. This cover shall be about half an inch deep, so that its top may be half an inch above the surface of the petroleum to be tested. In the cover there must be fitted a Fahrenheit thermometer, with a spherical bulb, in the scale of which ten degrees shall occupy at least half an inch in length; the thermometer must be placed in such a position that the bulb shall be just covered by the petroleum.

Near the front edge of the cover there shall be a circular opening, and through this the petroleum is to be tested. This opening is to be provided with a small movable cover.

In making the experiment with this apparatus, the water in the outer vessel shall in every case be heated to eighty degrees Fahrenheit before the petroleum is put into the inner vessel. When the temperature of the water has reached eighty degrees, the source of heat must be withdrawn, the inner vessel must then be filled with the petroleum to be tested up to the level of the outer rim or flange, which must be indicated by a mark on the inside, and the cover with the thermometer must be put in its place. The source of heat must now be again placed beneath the vessel containing the water, and when the temperature of the petroleum in the inner vessel has reached eighty degrees, a small light should be applied to the circular opening in the cover; if the vapor be not ignited, that is, if no pale blue flash or flicker of light be produced, the application of the light should be repeated at about every two degrees of increase of temperature until the flash of the ignited vapor be observed, and the temperature at which the first takes place is the temperature at which that sample of petroleum gives off an inflammable vapor.

In every case a second experiment shall be made to check the results obtained in the first.

A model of the apparatus described above is deposited with the warden of the standards, and reference shall be made to it in case of any difficulty or dispute as to the meaning of the terms employed in this description.

SCHEDULE TWO.

Year and Chapter.	Title.	Extent of Repeal.
25 & 26 Vict. c. 66.....	An Act for the Safe Keeping of Petroleum.....	The whole Act.....
29 & 30 Vict. c. 69.....	The Carriage and Deposit of Dangerous Goods Act, 1866.....	Sections eight and nine.
31 & 32 Vict. c. 56.....	The Petroleum Act, 1868.....	The whole Act.....

HOUSE OF LORDS.

PETROLEUM BILL.—*June* 16.—A bill for the safe keeping of petroleum and other substances of a like nature was presented by the Earl of Morley, and read a first time.

June 20.—The Earl of Morley, in moving the second reading of the Petroleum bill, explained that it consolidated the former acts on the subject, and the existing regulations as to the landing, storage, etc.

UNITED STATES.

IN THE HOUSE OF REPRESENTATIVES.

JANUARY 29, 1869.

Read twice, referred to the Committee of Ways and Means, and ordered to be printed.
Not passed.

Mr. Moorhead, on leave, introduced the following bill:

A BILL to provide for the better security of life and property from the dangers of coal oil, crude petroleum, and their products, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the passage of this act there shall be levied and collected, in such manner and under such regulations as the Secretary of the Treasury shall prescribe, a tax of cents upon every barrel of distilled or refined coal oil or petroleum which shall be of the quality marked number one, as hereinafter provided; and a tax of cents upon every barrel of such distilled or refined oil or petroleum which shall not be equal in quality or grade to number one; and upon every barrel of benzine, benzole, naphtha, gasoline, and all other like products of coal oil or petroleum, and upon every barrel of crude coal oil or petroleum; and there shall be levied and collected a tax of cents upon every gallon of such distilled or refined oil or petroleum which shall not be equal in quality or grade to number one; and upon every gallon of benzine, benzole, naphtha, gasoline, or other like products of coal oil or petroleum in the hands of any person or persons other than the refiner or manufacturer thereof having the same for sale.

SEC. 2. *And be it further enacted*, That the Secretary of the Treasury shall appoint inspectors of distilled or refined coal oil or petroleum, whose duty it shall be to examine

and inspect and designate the quality of the products of all coal oil and petroleum that shall be distilled or refined in any State, Territory, or District in the United States. And if any person shall sell or remove from any distillery or refinery, or any establishment where coal oil or petroleum has been distilled or refined, any refined or distilled oil, without complying with the provisions of this act, such oil so sold or removed shall be seized and forfeited to the use of the United States; and any person or persons so offending shall be subject to a penalty of one thousand dollars, which shall be recovered before any court of competent jurisdiction, one-half of such penalties to go to the informer.

SEC. 3. *And be it further enacted*, That in order to ascertain the quality of distilled or refined coal oil or petroleum, it shall be submitted by the inspectors aforesaid to the process known as the "fire test," or such other mode of testing by which its quality shall be ascertained, as shall be approved by the Secretary of the Treasury; and all such oil when so tested, which will not ignite at a lower temperature than one hundred and ten degrees of the Fahrenheit thermometer, shall be designated as number one refined oil; and all such oil which will ignite at a lower temperature than one hundred and ten degrees, when tested as aforesaid, and all benzine, benzole, naphtha, gasoline, and other like products of coal oil or petroleum, and all crude coal oil, or petroleum, shall be designated by other and higher numbers in such manner as shall be approved by the Secretary of the Treasury.

SEC. 4. *And be it further enacted*, That before any such distilled or refined oil shall be taken from the premises where it has been distilled or refined it shall be put into good tight iron-hooped barrels or casks, or barrels or casks equal in strength and security to such iron-hooped barrels or casks, and the heads of all barrels or casks containing oil which will not ignite at a temperature lower than one hundred and ten degrees by the test aforesaid, shall be printed white; and there shall be marked thereon, in plain black letters, the name of the person or the company who distilled or refined the same, and the name of the works, and the place where it was distilled or refined, and also the name of the inspector who inspected the oil, and the number designating its quality. And all such distilled or refined oil which will ignite at a lower temperature than one hundred and ten degrees, when tested as aforesaid, and all benzine, benzole, naphtha, gasoline, and all other dangerous products of coal oil or petroleum, shall be put into barrels or casks of the quality aforesaid, and the heads thereof shall be painted red; and the name of the person or the company who distilled or refined the same, and the place where distilled or refined, also the name of the inspector who inspected the same, and the appropriate number designating the quality of the contents of such barrel or cask, shall be marked thereon in plain white letters; and all crude coal oil or petroleum which shall be barrelled or put into casks, shall be put into barrels or casks of the quality aforesaid, the heads of which shall be painted red, and the contents shall be marked thereon in plain white letters; and every person who shall falsely mark, or cause to be falsely marked, any such barrel or cask, or who shall put into any such barrel or cask, the head or heads of which are painted white, and marked with black letters, oil which will ignite at a lower temperature than one hundred and ten degrees when subjected to the test aforesaid, or who shall put any such oil or any benzine, benzole, naphtha, gasoline, or other like dangerous product of coal oil or petroleum, or crude coal oil or petroleum, into any barrel or cask that shall not be painted and marked in accordance with the provisions of

this act; and if any person shall put or cause to be put any such oil of an inferior quality, or benzine, benzole, naphtha, gasoline, or other like products of coal oil or petroleum, or crude coal oil or petroleum, into any barrel or cask, the color or marks upon which indicate the contents thereof as being of a higher quality; or if any person shall sell any such article or product without stating to the purchaser the true character of the same, such person or persons shall be subject to the penalties imposed by the second section of this act; and if any explosion, fire, or other disaster shall occur by reason of any such violation of this act, such person or persons so offending shall be further punished by imprisonment for a period not to exceed ten years.

SEC. 5. *And be it further enacted*, That each inspector appointed under the provisions of this act shall be paid at the rate of cents per barrel or cask for every barrel or cask he shall inspect; and for every barrel or cask of oil which shall be inferior in quality to number one oil, and for every barrel of benzine, benzole, naphtha, gasoline, or other like products of coal oil, or petroleum, he shall be paid at the rate of cents per barrel; which shall be paid out of the revenue received under the provisions of this act in such manner as the Secretary of the Treasury shall prescribe.

SEC. 6. *And be it further enacted*, That the Secretary of the Treasury shall make such rules and regulations as may be necessary to secure the proper execution of this act, and may from time to time cause special examinations to be made into the administration thereof.

SEC. 7. *And be it further enacted*, That all moneys collected by virtue of this act shall be paid into the treasury of the United States; and separate accounts thereof shall be kept; and said moneys, or so much thereof as may be necessary, is hereby appropriated for the payment of the expenses of carrying into effect the provisions of this act; and all officers of the treasury department shall render such services in connection with the enforcement of this act as the Secretary of the Treasury shall prescribe.

STATE OF MAINE.

In the Year of our Lord one thousand eight hundred and sixty-seven.

AN ACT to provide for the inspection of petroleum and coal oils and burning fluids, to regulate the manufacture and sale thereof.

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows:

SECTION 1. In every city and town in this State containing two thousand inhabitants or more, the mayor and aldermen or the selectmen shall, on or before the first day of May annually, appoint one or more persons to be inspectors of petroleum and coal oils and burning fluids, who shall be sworn to the faithful discharge of their duties. And it shall be their duty, when requested, to inspect such oils and burning fluids, by applying the fire test with some accurate instrument, to ascertain the igniting or explosive point thereof in degrees of Fahrenheit's thermometer; and they shall cause every vessel or cask thereof by them so inspected to be plainly marked by the name of such inspector, the date of inspection, and the igniting or explosive point of the contents thereof.

SEC. 2. Whenever any cask or vessel of such oil or fluid will not bear the fire test of at least one hundred and twenty degrees Fahrenheit without ignition or explosion, the same shall be marked as aforesaid, and shall also be marked—unsafe for illuminating purposes. And if any inspector shall knowingly put false marks upon any such casks or vessels of such oils and fluids inspected by him, he shall be punished by a fine of not exceeding five hundred dollars, or by imprisonment for a term of six months in the county jail.

SEC. 3. Every person and corporation engaged in manufacturing, in any city or town in this State, any such petroleum or coal oil or burning fluid, shall cause every cask or other vessel thereof to be inspected and marked as aforesaid, by a sworn inspector. And if any person, or the agent or the officer of any corporation, shall manufacture and sell within this State any such oil or burning fluid, without first causing it to be inspected and marked as aforesaid, or that has been so inspected and marked as unsafe for illuminating purposes, he shall be punished by a fine of not exceeding five hundred dollars, or by imprisonment six months in the county jail.

SEC. 4. No person shall sell any such oil or burning fluid without first causing each cask or vessel of the same to be duly inspected and marked as aforesaid, unless it has already been so inspected and marked in this State or elsewhere; and if any person shall sell such oil or burning fluid that has not been so inspected and marked, or that has been so inspected and has been marked as unsafe for illuminating purposes, he shall be punished by a fine of not exceeding five hundred dollars, or by inprisonment in the county jail six months.

SEC. 5. All prosecutions under the second, third, and fourth sections of this act shall be by indictment.

SEC. 6. The selectmen of towns, and the mayor, aldermen, and police of cities, or any one of them, shall have the right at all times to examine all such oils and fluids kept in their respective cities and towns for sale, and to cause the same to be inspected and tested; and it shall be their duty to do so in all cases where they are informed or believe such oils or fluids are kept for sale in violation of law; and whenever they shall find any person keeping or selling any such oil or fluid in violation of the provisions of this act, it shall be their duty to cause such persons to be prosecuted therefor.

SEC. 7. This act shall take effect on and after the first day of June, eighteen hundred and sixty-seven.

Approved March 1, 1867.

VERMONT.

AN ACT regulating the sale of coal and petroleum oils.

It is hereby enacted by the General Assembly of the State of Vermont:

SEC. 1. The mayor and aldermen of any city, or the selectmen of any town, or the bailiffs or trustees of any incorporated village, where oils are sold, and where five or more inhabitants petition for the same, shall appoint annually one or more suitable per-

sons, not interested in the sale of said oils, as inspectors thereof, and fix their compensation, to be paid by the parties requiring the services of said inspectors.

SEC. 2. Every inspector, before entering upon the duties of his office, shall be duly sworn, and when called upon by any vendor, purchaser, or by any officer mentioned in the sixth section of this act, to test such oils, shall do so with all reasonable dispatch, by applying the fire test, as indicated and determined by G. Tagliabue's pyrometer, or some other instrument equally accurate. Any inspector, guilty of fraud, deceit or culpable negligence in inspecting such oils, shall be punished by fine not exceeding one hundred dollars, or imprisonment in the county jail not exceeding one month, or both, in the discretion of the court.

SEC. 3. No person shall mix for sale, naphtha and illuminating oils, or shall sell or offer for sale such mixture, or shall sell or offer for sale, except for purposes of re-manufacture, illuminating oils made from coal or petroleum, which will ignite at a temperature of less than one hundred and ten degrees, Fahrenheit, to be ascertained by the application of Tagliabue's, or some other approved instrument; and any person so doing, shall be held to be guilty of a misdemeanor, and shall, for each offence, upon conviction thereof, be liable to the same penalties provided in the second section of this act against inspectors; and shall also be liable therefor to any person suffering damage from the explosion or ignition of such oil, thus unlawfully sold; and such oil, thus unlawfully sold, or kept, or offered for sale, and the casks or packages containing the same, shall be forfeited and sold for the purposes of re-manufacture; one-half of the proceeds of such sale to go to the State, and the other half to the informer.

SEC. 4. For all the purposes of this act, all illuminating oils, made from coal or petroleum, having an igniting point of less than one hundred and ten degrees, Fahrenheit, to be determined in the manner provided in the third section of this act, shall be deemed to be mixed with naphtha.

SEC. 5. Any person who shall sell, or keep, or offer for sale, naphtha, under the name of oil, shall, for each offence, upon conviction thereof, be liable to the same penalties provided, and shall be subject to the same liabilities set forth in the second and third sections of this act.

SEC. 6. The selectmen of the towns, and the mayors, aldermen and police of the cities, and the bailiffs, or trustees and police of incorporated villages, in which inspectors are appointed, in conformity with the first section of this act, or any one of said officers within their respective towns, villages and cities, shall cause all persons violating any of the provisions of this act to be prosecuted therefor.

SEC. 7. This act shall take effect upon its passage.

Approved November 18, 1868.

MASSACHUSETTS.

General Laws.—[Chap. 152.]

AN ACT to provide for the storage, sale, and inspection of petroleum and its products.

Be it enacted, etc., as follows:

SECTION 1. The mayor and aldermen of every city, and the selectmen of every town of more than fifteen hundred inhabitants, and of every town of less than fifteen hun-

dred inhabitants, upon the written application of five or more citizens of such town therefor, shall appoint, annually, one or more suitable persons, not interested in the sale of crude petroleum, or in the sale or manufacture of petroleum, earth rock oil, or in any of their products, to be inspector or inspectors thereof in said city or town, and fix their compensation, to be paid by persons requiring their services under the provisions of this statute, and who before entering upon the duties of their office shall be duly sworn. Any inspector guilty of fraud, deceit, or culpable negligence in the performance of his duties, shall be punished by fine not exceeding one hundred dollars, or imprisonment in the county jail or house of correction not exceeding one month, or by both, in the discretion of the court.

SEC. 2. No person shall mix for sale naphtha and illuminating oils, or shall sell or offer for sale such mixture, or shall sell or offer for sale, except for purposes of re-manufacture, illuminating oils made from coal or petroleum, which will evaporate a gas under one hundred degrees Fahrenheit or ignite at a temperature of less than one hundred and ten degrees Fahrenheit, to be ascertained by the application of Tagliabue's, or some other approved instrument; and any person so doing shall for each offence be punished by fine or imprisonment, as provided in the first section hereof; and shall also be liable therefor, to any person suffering damage from the explosion or ignition of such oil thus unlawfully sold or kept, or offered for sale; and such oil thus unlawfully sold or kept, or offered for sale, and the casks or packages containing the same shall be forfeited and sold, one-half of the proceeds of such sale to go to the Commonwealth and the other half to the informer.

SEC. 3. For all the purposes of this act, all illuminating oils made from coal or petroleum having an igniting point of less than one hundred and ten degrees Fahrenheit, to be determined in the manner provided in the second section of this act, shall be deemed to be mixed with naphtha and shall be branded unsafe for illuminating purposes.

SEC. 4. Any person who shall sell, or keep, or offer for sale naphtha under any assumed name, shall for each offence, upon conviction thereof, be liable to the same penalties provided, and shall be subject to the same liabilities set forth in the first two sections of this act.

SEC. 5. Crude petroleum, or any of its products, may be stored, kept, manufactured or refined in detached and properly ventilated buildings specially adapted to the purpose, and surrounded by an embankment constructed so as to effectually prevent the overflow of said petroleum or any of its products beyond the premises on which the same may be kept, manufactured, or refined; said buildings to be occupied in no part as a dwelling; and if less than fifty feet from any other building, must be separated therefrom by a stone or brick wall at least ten feet high and twelve inches thick; and any person keeping such articles in any other kind of building, except as is hereinafter provided in the sixth section hereof, shall be punished by fine or imprisonment, in the manner provided in the first two sections hereof.

SEC. 6. No person shall manufacture, refine, mix, store, or keep for sale any oil or fluid composed wholly or in part of any of the products of petroleum, in any city or town, except as provided in the fifth section of this act, without a license first having been obtained from the mayor and aldermen of said city or the selectmen of said town, and in said license there shall be expressed the manner, and the portion of any locality

or building in which said articles may be mixed, stored or kept; and whoever mixes, stores, or keeps said articles in any one locality, except as aforesaid, without having first obtained a license as herein required, or having obtained such license, mixes, stores, or keeps said articles in a different manner, or in any other portion of said locality or building than is expressed in said license, shall forfeit and pay a sum not exceeding five hundred dollars, to be recovered in any appropriate form of action, to be instituted in the name of the mayor of said city, or of the selectmen of said town; and the license granted in accordance with the provisions of this act shall continue to be in force from the time of granting the same until the first day of April next succeeding, unless sooner revoked; and said license shall be revokable at all times by the authorities granting the same.

SEC. 7. Upon complaint made to the justice of any municipal or police court, or to a justice of the peace, by the mayor or by an alderman of any city, or by a selectman of any town, or by an inspector appointed under the provisions of this act, or any engineer of a fire department, fireward, chief of police, or city marshal, that he has probable cause to suspect, and does suspect, that any of the articles enumerated in this act are offered for sale, or are deposited and kept within the limits of said city or town, contrary to the provisions of this act, said justice or court may issue a warrant directed to any such inspector, engineer or fireward, or to any sheriff, deputy-sheriff, constable or police officer, ordering him to enter any shop, warehouse, manufactory, or any other building specified in the warrant, to make diligent search for such article or articles suspected to be so offered for sale, deposited or kept, and to make return of his doings to said justice or court forthwith.

SEC. 8. None of the articles enumerated in this act shall be allowed to remain in any street, lane, alley, or travelled way, or upon any wharf, or in any yard, or on the grounds of any railroad corporation in any city for a longer time than twenty-four hours, and in any town for a longer time than forty-eight hours, without a special permit from the mayor and aldermen of said city, or the selectmen of said town, or from some person by them duly authorized; and any and all persons so keeping such articles for a longer time, shall be punished by a fine of not more than fifty dollars for each and every such offence.

SEC. 9. The city council of any city, and the inhabitants of any town, may adopt such ordinances, by-laws and regulations not inconsistent with the provisions of this act, as they may deem reasonable in relation to the manufacture, mixing, storing, keeping or selling within the corporate limits of said city or town, any of the articles herein enumerated, and may affix penalties for breaches thereof not exceeding fifty dollars for each offence, reasonable notice of which shall be given to all concerned.

SEC. 10. Chapter two hundred and eighty-five of the acts of the year eighteen hundred and sixty-six, and chapter two hundred and eighty-six of the acts of the year eighteen hundred and sixty-seven, so far as they are inconsistent with the provisions of this act, are hereby repealed.

SEC. 11. No person shall sell, or keep for sale, or in storage, any crude or refined petroleum, naphtha, kerosene, earth rock, machinery or illuminating oil, in any city or town, without having the same inspected and approved by an authorized inspector. And any person violating the provisions of this section shall be fined and imprisoned in the manner provided in the first section of this act in relation to inspectors.

SEC. 12. The first and tenth sections of this act shall take effect upon its passage, and the remaining sections thereof sixty days after its passage.

Approved April 10, 1869.

[*Chap.* 345.]

AN ACT to amend "An act to provide for the storage, sale, and inspection of petroleum and its products."

Be it enacted, etc., as follows:

SEC. 1. The eleventh section of chapter one hundred and fifty-two of the acts of the year eighteen hundred and sixty-nine, is hereby repealed.

SEC. 2. No person shall sell, or keep for sale at retail, for illuminating purposes, any kerosene, refined petroleum, or any product of petroleum, without having the same inspected and approved by an authorized inspector. Any person violating the provisions of this section shall be fined and imprisoned in the manner provided in the first section of chapter one hundred and fifty-two of the acts of the present year.

Approved June 2, 1869.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS.

In General Assembly, January Session, A. D. 1871.

AN ACT to regulate the inspection, sale, and keeping of inflammable and explosive fluids.

It is enacted by the General Assembly as follows:

SECTION 1. No person shall keep for sale, or offer for sale, in any place or building within this State, petroleum oil or any product thereof, or shall knowingly keep for sale, or offer for sale, any mixture of naphtha, or inflammable fluids for illuminating purposes, for use in lamps or other portable receptacles, that will flash or inflame at a less temperature, or fire test, than one hundred and ten degrees Fahrenheit, or that has not been inspected, tested, and the cask, barrel, or package containing the same, marked with the degrees Fahrenheit at which the contents thereof will flash or inflame, in manner provided by section two of this act, nor shall any person empty any petroleum oil or any product thereof, or any mixture of naphtha, or inflammable fluids which shall be at any time brought into this State, out of the original packages in which it is brought into this State, until the same has been inspected by the inspector of kerosene.

SEC. 2. It shall be the duty of the inspector of kerosene to inspect and test all petroleum oil, kerosene, and coal oil, and their compounds, and any product or mixture thereof, which may be manufactured, offered for sale, or stored in this State, with Tagliabue's Coal Oil Tester, and to legibly mark upon every cask, barrel or package, so tested by him, the degrees Fahrenheit at which the contents thereof are inflammable, or will flash or explode, by cutting, branding, or painting the same thereon, together with his official brand or stamp, and the initials of his name; and for every cask, barrel, or other package so inspected and branded, the owner thereof shall pay the inspector as compensation therefor, twenty-five cents, in case he shall inspect only one cask, barrel or package, at any one time; twenty cents in case he shall inspect more than one, and

with Tagliabue's Coal Oil Tester, or some other improved instrument for that purpose, and to legibly mark upon every cask, barrel, or package so tested by him, the degree Fahrenheit at which the contents thereof are inflammable or will explode, by cutting, branding, or painting the same thereon, together with his official brand or stamp and the initials of his name; and for every cask, barrel, or other package so inspected and branded, the owner thereof shall pay the Inspector, as compensation therefor, twenty-five cents, in case he shall inspect only one cask, barrel, or package at any one time; twenty cents in case he shall inspect more than one, and not exceeding five casks, barrels, or packages at any one time, and fifteen cents, in case he shall inspect more than five casks, barrels, or packages at any one time.

SEC. 4. Any person who shall violate either of the above-named provisions of this ordinance, or shall knowingly or wilfully alter, efface, or destroy any official mark or brand, after the same has been placed by the Inspector of Kerosene upon any barrel, cask, or package, in accordance with the provisions of section third of this ordinance, shall be punished by a fine of not less than fifty dollars, and not more than two hundred dollars, or by imprisonment not exceeding six months.

SEC. 5. All ordinances and parts of ordinances inconsistent herewith are hereby repealed.

PENNSYLVANIA.

AN ACT for the better security of the city of Philadelphia from dangers incident to the refining or improper and negligent storage of petroleum, benzine, benzole, or naphtha.

SECTION 1. *Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met*, and it is hereby enacted by the authority of the same, That after ninety days from the passage of this act, no petroleum, benzine, benzole, or naphtha shall be refined or manufactured within the city of Philadelphia, on the eastern side of the river Schuylkill, between Allegheny avenue and Mifflin street, excepting throughout the area southward of Washington street, and between the river Schuylkill and Thirtieth street, or on the western side of the river Schuylkill, south of Girard avenue and east of Forty-third street; nor shall the same be kept or stored in any building or other premises within such limits, in any greater quantity at any one time than twenty-five barrels of refined petroleum and one barrel of crude petroleum, and one barrel of benzine, benzole, or naphtha respectively; the said barrels to be kept or stored in buildings with cellars of sufficient depth, or in premises properly excavated or embanked, to prevent any overflow of the fluids therefrom, under forfeiture, as hereinafter directed, of the entire quantity of each, and all of the said articles of merchandise that shall be so refined, kept, or stored contrary to the restrictions of this act; *Provided*, That it shall be lawful to keep or store the said quantities of refined petroleum, crude petroleum, benzine, benzole, or naphtha, within the designated limits, without license therefor, first had from the mayor of the city of Philadelphia, upon due certificate to be given by the fire marshal of the said city, that the cellar, excavation, or premises, in which storage, as aforesaid, shall be authorized,

will afford reasonable security from special danger in case of accidents or fire, for which license the sum of ten dollars shall be paid to the city treasury; and such license to be renewed for each calendar year, upon annual payment as aforesaid; *Provided*, That those persons engaged in the business of refining petroleum within the above limits, who have erected iron tanks and other suitable and safe protection against the escape and dispersion of the same, which fact shall be certified by the fire marshal to the mayor, shall not be subject to the provisions of this act until the expiration of one year from the passage hereof. *And, provided further*, That nothing herein contained shall prevent the refining, storing, or depositing of crude or refined petroleum or coal oil on the west side of the Schuylkill, east of Thirtieth street, between Bridge street and Arch street, and between Chestnut street and South street, on premises with sufficient excavations or embankments to prevent the overflow or escape of the oil so refined, stored, or deposited in case of fire or accident. *And provided further*, That no refining of petroleum, benzine, benzole, or naphtha shall be carried on within five hundred feet of the east or west side of the river Schuylkill, within the said city, north of the line of Girard avenue.

SEC. 2. That it shall be lawful to refine, manufacture, store, and keep petroleum, benzine, benzole, or naphtha in such quantities as may be desired in those portions of the city of Philadelphia east and west of the river Schuylkill, not included within the limits designated in the first section of this act for prohibition therefrom; *Provided*, that the same be at least one hundred feet distant from any dwelling, without the written consent of the owner thereof. *And provided further*, that a license be first had from the mayor of the city of Philadelphia, for which ten dollars shall be paid into the city treasury, and likewise for the annual renewal thereof, after certificate, to be given by the fire marshal of the said city, upon actual survey and inspection of the building or premises in which said commodities shall be refined, kept, or stored, or are designed so to be, that the said buildings or premises have suitable tanks, cellars, excavations, or embankments, to prevent the overflow or escape of petroleum and like commodities in the event of accident or fire; which certificate of survey and inspection shall be returned to the mayor, whereupon, if the same be approved by him, he shall issue his license in accordance with the provisions of this act.

SEC. 3. Whenever any inhabitant of the said city shall make oath or affirmation, before the mayor of the city of Philadelphia, which shall afford probable cause to believe that any petroleum, benzine, benzole, or naphtha is improperly stored, kept, or refined, contrary to the provisions of this act, it shall be lawful for the said mayor to issue his warrant or warrants to any police officer of the said city, or other fit persons, commanding him or them to search for such petroleum, benzine, benzole, or naphtha, wherever the same may be, in violation of any of the provisions of this act, and, if found, to seize and take possession of the same, and cause the same to be removed to such safe place as the mayor shall thereupon designate in writing.

SEC. 4. All actions or suits for the recovery of any petroleum, benzine, benzole, or naphtha which may have been seized and detained by virtue of the provisions of this act, or for the value thereof, or for damages sustained by the seizure or detention thereof, shall be brought against the Philadelphia Association for the Relief of Disabled Firemen, and shall be commenced within one calendar month after such seizure shall

have been actually made; and in case no action or suit shall have been commenced within such period, such petroleum, benzine, benzole, or naphtha shall be deemed absolutely forfeited to said Philadelphia Association for the Relief of Disabled Firemen, and may be immediately delivered up to the proper officers thereof for its use.

ARTHUR G. OLMSTED,
Speaker of the House of Representatives.

WILLIAM J. TURRELL,
Speaker of the Senate.

Approved the second day of March, Anno Domini one thousand eight hundred and sixty-five.

A. G. CURTIN.

Subsequent acts merely extended the operations of the act to other parts of the State.

MARYLAND.

AN ACT to regulate the manufacture and sale of oils for illuminating purposes.

SECTION 1. *Be it enacted by the General Assembly of Maryland*, That all oils or fluids manufactured from petroleum or its products, used for illuminating purposes in this State, which shall be manufactured or kept for sale therein, shall be required to stand a fire test of one hundred and ten degrees Fahrenheit before they shall burn, to be ascertained by the instrument adopted by the Petroleum Board of Trade.

SEC. 2. *Be it enacted*, That any one manufacturing or selling illuminating oils or fluids manufactured from petroleum or its products, by the barrel, shall be required to have stamped upon the head of the barrel the name of the manufacturer and seller thereof, and his place of business, together with the words, "warranted to stand a fire test of one hundred and ten degrees Fahrenheit before it shall burn," and any manufacturer or seller disposing of five gallons or more shall furnish a certificate of test, as above; provided, that the fire test herein provided shall not apply to the manufacture, sale or use of the illuminating fluid known as gasoline.

SEC. 3. *Be it enacted*, That whoever manufactures or keeps for sale, for illuminating purposes, oils or fluids made from petroleum or its products, and which do not sustain the fire test provided for in section one of this act, or who shall sell the same to others for such purposes, shall forfeit said oil, which shall be declared confiscated, one half to the informer and the remainder to the State.

SEC. 4. *And be it enacted*, That any purchaser of oils or fluids made of petroleum or its products, for illuminating purposes, bearing stamp or certificate, as provided in section two of this act, and which do not stand the fire test provided in section one of this act, may recover from the seller in an action for debt an amount equal to the purchase money of said oil.

SEC. 5. *Be it enacted*, That any accident by reason of explosion occurring when the oil or fluid aforesaid used does not reach the test provided for in this act shall subject the manufacturer or other party proved to have adulterated said oil, if residents of this State, or seller thereof, if manufactured out of the State, to be prosecuted for a misde-

meanor, and upon conviction thereof in a court of competent jurisdiction, to fine or imprisonment, or both, at the discretion of the court; and any one adulterating oils so as to reduce them below the standard provided in this act, and selling the same for illuminating purposes, or who shall knowingly use for illuminating purposes oils under test, as hereinbefore provided, shall be subject to the same penalties provided in sections three, four, and five thereof for manufacturers and sellers.

SEC. 6. *Be it enacted*, That any oils confiscated in Baltimore City, as provided for in this bill, shall be tested by or in presence of the Fire Inspector of Baltimore, appointed by the insurance companies of said city, and he shall decide the test of such oil.

Approved April 4, 1871.

OHIO.

AN ACT to provide for the inspection of mineral oils for illuminating purposes, and to repeal acts therein named.

SECTION 1. *Be it enacted by the General Assembly of the State of Ohio*, That upon the application of five or more citizens of any county in this State, wherein any mineral oils are made, refined or produced for the purpose of burning in any kind of lamp as an illuminator, or where any of them are sold for that purpose, the judge of the court of common pleas shall appoint a sufficient number of suitable and qualified persons, who are not interested in the making or vending of any of said oils, who shall, at their own expense, provide themseves with the necessary instruments and apparatus for testing the quality of said oils for illuminating purposes, that they shall be requested by any manufacturer, refiner, dealer, vender or producer to test and examine, and if, upon such testing or examination, the oils so tested shall meet the requirements hereinafter specified, the inspector shall fix his brand and device "approved," with the date, upon the package, cask or barrel containing the same; and it shall be lawful for any manufacturer, refiner, dealer or producer to sell the same as an illuminator. But if the oil so tested shall not meet the requirements hereinafter specified, he shall mark upon such package, cask or barrel, "rejected for illuminating purposes," under his name, and it shall be unlawful for the owner thereof to sell it for illuminating purposes, under the pains and penalties hereinafter provided.

SEC. 2. It shall be the duty of the inspector, when called upon for that purpose, promptly to inspect all oils hereinbefore mentioned, and to reject as dangerous all of said mineral oils, known by whatsoever name, which, at the temperature of one hundred and ten degrees Fahrenheit's thermometer, will emit an explosive gas; provided, that the instrument used in testing of said mineral oils shall be that made with a suspended wick, by John Tagliabue, of New York; and provided, also, that the quantity of oil used in the test shall not be less than half a pint, and the temperature slowly raised to the degree at which such explosive gas is emitted, or to that hereinbefore provided as a test.

SEC. 3. That if any person, whether manufacturer, refiner, dealer or producer, shall sell or attempt to sell to any person in this State any of said mineral oils for illuminating purposes, whether manufactured, refined or produced in this State or not, before having

the same inspected, as provided by this act, or if any manufacturer, refiner, vender, producer or inspector of said mineral oils for illuminating purposes, shall falsely brand the package, cask or barrel containing the same, as provided in the first section of this act, or shall use barrels, casks, or packages having the inspector's brand, without the oil therein having been inspected, he or they so offending, upon conviction thereof, shall be fined in any sum not exceeding five hundred dollars nor less than one hundred dollars, or be imprisoned in the county jail not exceeding six months, or both, at the discretion of the court; and any person violating any provision of this act, or who shall neglect to do what is required herein, shall be liable to any party injured for any damage sustained thereby, and if any loss of life result as a consequence of not doing what he is herein required, or by the neglect of the manufacturer, refiner, dealer, producer or inspector to do what is hereby enjoined, the person so delinquent shall be deemed guilty of manslaughter and punished according to the statute in such cases made and provided.

SEC. 4. All prosecutions for fines and penalties under the provisions of this act shall be by indictment in the court of common pleas of the proper county, and when collected the one-half of the same shall be paid to the informer, and the remaining one-half be paid into the county treasury for the use of the county.

SEC. 5. Every person appointed inspector shall, before he enters upon the duties of his office, take an oath or affirmation to support the constitution of this State and of the United States, and perform the duties of his office with fidelity. He shall also execute a bond to the State of Ohio, in such sum and with such surety as shall be approved by the court of common pleas of the county where appointed, conditioned for the faithful performance of the duties imposed on him by this act, which bond shall be for the use of all persons aggrieved by the acts or neglects of such inspector.

SEC. 6. The term of office of an inspector shall be for three years; and every inspector shall, upon requisition of any manufacturer, vender, or producer of the oils herein mentioned, proceed without unnecessary delay to the inspection thereof; and the said inspector shall be entitled to demand and receive from the owner or party calling upon him, where there are three or more refineries of said mineral oils in a county, the sum of six cents for every package, cask, or barrel of said refined mineral oils or crude petroleum, and when there are a less number of refineries in any county, the sum of ten cents for any package, cask, or barrel inspected and branded by him.

SEC. 7. No inspectors shall, while in office, buy, sell, barter, or otherwise trade, directly or indirectly, in any of the aforesaid mineral oils which they are appointed to inspect; and for the violation of this section they shall be liable to a fine of not more than five hundred and not less than two hundred dollars, to be collected in accordance with the provisions of section five of this act.

SEC. 8. That an act passed May first, 1862, entitled "An act to provide for the inspection of petroleum oils for illuminating purposes," and an act amendatory thereto, passed March nine, 1866, be and the same are hereby repealed.

SEC. 9. This act shall be in force from and after its passage.

ED. A. PARROTT,
Speaker of the House of Representatives.

ANDREW G. McBURNEY,
President of the Senate.

April 16, 1867.

ILLINOIS.

AN ACT to provide for the inspection and sale of mineral oils used for illuminating purposes.

SECTION 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly*, That the mayor and aldermen of any city, or the board of trustees of any town, wherein any coal, petroleum, or other mineral oils are made, refined, produced or sold for illuminating purposes, and where five or more inhabitants petition for the same, shall appoint, annually, one or more suitable persons, not interested in the manufacture or sale of said oils, as inspectors thereof, and shall fix their compensation, to be paid by the parties requiring the services of said inspectors.

SEC. 2. Every inspector, before entering upon the duties of his office, shall be duly sworn. He shall also execute a bond to the State of Illinois, in such sum and with such surety as shall be approved by the probate court of the county where appointed, conditioned for the faithful performance of the duties imposed on him by this act, which bond shall be for the use of all parties or persons aggrieved by the acts or neglect of such inspector. And when called upon by any manufacturer, refiner, producer, dealer, or purchaser of such oils, or by any officer mentioned in section five of this act, to test such oils, the said inspector shall do so, with all reasonable dispatch, by applying the fire-test, as indicated and determined by J. Tagliabue's pyrometer, or some other instrument equally as accurate, with which he shall have provided himself at his own expense; and if the oils so tested will not ignite or explode at a temperature less than one hundred and ten degrees Fahrenheit, the inspector shall mark, plainly and indelibly, on each cask, barrel, or package, "approved, fire test being——," but if said oils will ignite at a temperature less than one hundred and ten degrees Fahrenheit, as aforesaid, then the inspector shall mark on each cask, barrel or package, "condemned for illuminating purposes—fire test being——." Said inspector, while in office, shall not buy, sell, bargain or trade, directly or indirectly, in any of the said oils. He may appoint deputies, for whom he shall be responsible, and who shall perform the duties of inspector. He shall keep an intelligible record of each inspection made, within twenty-four hours thereafter, in a book prepared for the purpose, which shall be open to all parties interested. Any inspector found guilty of fraud, deceit, or culpable negligence in the performance of any of his duties, as prescribed in this section of this act, shall be punished by fine not exceeding one hundred dollars, or imprisonment in the county jail not exceeding one month, or both, in the discretion of the court.

SEC. 3. Any manufacturer, refiner, producer, or dealer, who shall neglect to give notice to said inspector of any such oil in his or her possession, not already inspected by any duly authorized inspector of the State of Illinois, within two days after the same shall have been made, refined, procured, or purchased, shall be liable to the same penalties provided in the second section of this act against inspectors.

SEC. 4. Any person, whether manufacturer, refiner, producer, or dealer, who shall sell or attempt to sell to any person in this State, any of said oils for illuminating purposes, whether manufactured, refined, or produced in this State or not, which shall be below the "approved" standard—that is, having an igniting point less than one hundred and ten degrees Fahrenheit—as indicated and determined in the manner described in the

second section of this act, or before having the same inspected as herein provided; or if any manufacturer, refiner, producer, dealer, or inspector of said oils shall falsely brand the package, cask, or barrel containing the same, as provided in the second section of this act, or shall use barrels, packages, or casks having the inspector's brand thereon, and the oil therein not having been inspected, he or they so offending, upon conviction thereof, shall be liable to the same penalties provided in the second section of this act against inspectors; the casks, barrels, or packages containing the same shall be forfeited and sold—one-half of the proceeds of such sale to go to the school fund of the county, and the other half to the informer—and, further, shall be liable to any person or persons for all damages sustained by him or them by the explosion or ignition of such oil thus unlawfully kept and sold.

SEC. 5. The mayor, aldermen, and police of any city, and the board of trustees of any town in which an inspector is appointed in conformity with the first section of this act, or any one of said officers, within his respective city or town, shall cause all persons violating any of the provisions of this act to be prosecuted therefor.

SEC. 6. All prosecutions for fines and penalties, under the provisions of this act, shall be by action of debt or indictment in any court of competent jurisdiction, and the fines so collected shall be paid one-half to the informer and one-half into the school fund of the county wherein the same shall be collected.

SEC. 7. This act shall be deemed a public act, and shall take effect and be in force from and after its passage.

Approved April 19, 1869.

CHICAGO BOARD OF HEALTH.

January 4, 1870.

Be it ordained by the Board of Health of the City of Chicago:

1st. That on and after January 15, 1870, it shall be unlawful for any person or persons to sell any oil, kerosene, petroleum, burning-fluid, or other fluid intended for the purposes of illumination, without attaching to each package, bottle, can, or other vessel containing the same, the following

CAUTION:

Do not attempt to light a fire with this oil. Do not fill the lamp while it is burning, or at night. A lamp in daily use should be cleaned occasionally and all the oil removed from it, by daylight and not at night. Fill the lamp with oil daily. Do not place the oil near the fire, or where there is more than usual heat. Keep it in a cool place. Neglect of the above directions may result in the loss of your life and property.

2d. On and after January 15, 1870, it shall be unlawful for any person or persons engaged in the selling of kerosene oil, petroleum, or other fluid intended for illuminating purposes, to continue in the same without having first registered with this Board the name or title of the firm and street and number of the location of the same.

The printed caution required by the foregoing regulations will be furnished upon application at this office.

The penalty for the neglect or violation of any of the foregoing regulations is fixed by law at from five to five hundred dollars.

INDIANA.

AN ACT to provide for the inspection of petroleum oils for illuminating purposes, marking and branding the same; prescribing penalty for selling without inspection, or for falsely branding the cask, package, or barrel containing the same, or for violating any of the provisions of this act; for the appointment of inspectors and deputies, prescribing duties and terms of office, and imposing penalties for inspectors or deputies trading in any article they are appointed to inspect.

[Approved March 9, 1863.]

SECTION 1. *Be it enacted by the General Assembly of the State of Indiana*, That, upon the application of five or more citizens of any county in this State, wherein any coal oil, petroleum oil, or a mixture of coal and petroleum oils is made, refined, or manufactured for the purpose of burning in any kind of lamp as an illuminator, or where the same, or any one of them, is sold for that purpose, the judge of the Court of Common Pleas shall appoint a suitable and qualified person, who is not interested in the making or vending of any or either of said oils or burning fluids, who shall, at his own expense, provide himself with the necessary instruments and apparatus for testing the quality of said illuminating coal or petroleum oils or burning fluids, whose duty it shall be to examine and test the quality of all coal or petroleum oils or burning fluids that he shall be requested by any manufacturer, refiner, dealer, or vendor to examine; and if, upon such testing or examination, the oils or fluids so tested shall meet the requirements hereinafter specified, he shall fix his brand and device, "approved," with the date, upon the package, cask, or barrel containing the same, and it shall be lawful for any manufacturer or dealer to sell the same as an illuminator; but if the oil so tested shall not meet said requirements, he shall mark upon such package, cask, or barrel, "rejected for illuminating purposes," under his name, and it shall be unlawful for the owner thereof to sell it for illuminating purposes under the pains and penalties hereinafter provided.

SEC. 2. It shall be the duty of every manufacturer of refined coal oil, petroleum oil, or mixed coal and petroleum oils, to mark or brand upon the package, cask, or barrel containing the same, according to the fact, "illuminating coal, or petroleum, or mixed oil," in addition to their ordinary trade mark.

SEC. 3. It shall be the duty of the inspector, when called upon for the purpose, promptly to inspect all oils or burning fluids hereinbefore mentioned, and to reject as dangerous all petroleum oils which, at the temperature of one hundred degrees, Fahrenheit's thermometer, will emit an explosive gas, or take fire on plunging therein a well-lighted match, provided that the quantity of oil used in the test shall not be less than half a pint, and it shall be the duty of said inspector to designate by his brand the temperature at which such oils will ignite.

SEC. 4. That if any person, whether manufacturer or dealer, shall sell, or attempt to sell, to any person in this State, any of said illuminating oils, whether manufactured in this State or not, before having the same inspected as provided by this act, he shall,

upon conviction thereof, be fined in any sum not exceeding five hundred dollars; and if any manufacturer or vendor of either of said illuminating oils, shall falsely brand the package, cask, or barrel containing the same, as provided in the first section of this act, or shall use barrels, casks, or packages having the inspector's brand, without having the oil inspected, he, or they, so offending, upon conviction thereof, shall be fined in any sum not exceeding five hundred dollars, nor less than one hundred dollars, or be imprisoned in the county jail not exceeding six months, or both, at the discretion of the court; and any person violating any provision of this act, or who shall neglect to do what is required herein, whether manufacturer or dealer, shall be liable to any party injured for any damage sustained thereby; and if any loss of life result as a consequence of not doing what is herein required, or by the neglect or refusal to do what is hereby enjoined, by the manufacturer, refiner, or dealer, the person so delinquent shall be deemed guilty of manslaughter, and punished according to statute in such cases made and provided.

SEC. 5. All prosecutions for fines and penalties under the provisions of this act shall be by presentment in the Court of Common Pleas of the proper county, and when collected shall be paid into the county treasury for the use of the county.

SEC. 6. The several inspectors provided for in this act are hereby empowered, if necessary to the convenient despatch of their respective duties, to appoint a suitable number of deputies, for whom they shall respectively be accountable, which deputies are hereby empowered to perform the duties of inspection, and shall be liable to the same penalties as the inspector.

SEC. 7. Every person appointed inspector or deputy inspector shall, before he enters upon the duties of his office, take an oath or affirmation to support the Constitution of this State and of the United States, and perform the duties of his office with fidelity. He shall also execute a bond to the State of Indiana in such sum, and with such surety as shall be approved by the Court of Common Pleas of the county where appointed, conditioned for the faithful performance of the duties imposed on him by this act, which bond shall be for the use of all persons aggrieved by the acts or neglects of such inspector.

SEC. 8. The term of office of an inspector shall be for one year, and every inspector shall, upon the requisition of any manufacturer or vendor of the oils herein mentioned, proceed, without unnecessary delay, to the inspection thereof, and said inspector shall be entitled to demand and receive from the owner or party calling upon him the sum of five cents for any package, cask, or barrel inspected and branded by him.

SEC. 9. Every deputy inspector shall, within twenty-four hours after the inspection of the oils hereinbefore mentioned, return a true and exact account thereof to his principal, who shall make an entry of all oils inspected, in an intelligible manner, in a book prepared for that purpose, which shall be open to inspection by any person interested.

SEC. 10. No inspector or deputy inspector shall, while in office, buy, sell, barter, or otherwise trade, directly or indirectly, in any article which they are appointed to inspect; and for the violation of this section they shall be liable to a penalty not exceeding two hundred dollars, to be collected in accordance with the provisions of section five of this act.

GEORGIA.

AN ACT to protect the people of this State in the sale of kerosene oil.

SECTION 1. *Be it enacted by the Senate and House of Representatives of the State of Georgia*, That from and immediately after the passage of this act the standard for kerosene oil for sale in this State shall be one hundred and ten (110) degrees fire test.

SEC. 2. That any person or persons convicted of selling, offering for sale, or giving away kerosene oil of a fire test less than one hundred and ten (110) degrees fire test shall be fined in the sum of not less than one hundred dollars, nor more than five hundred dollars, one-half the fine to go to the informer, one-fourth to the inspector, and the remainder to the county treasury.

SEC. 3. That the duty of inspecting kerosene oil shall be performed by inspectors of fertilizers in each county, and if no inspectors of fertilizers in the county be qualified, then the ordinary, assisted by such persons as he may choose.

SEC. 4. That the following test be published for the information of all concerned: "Heat a small quantity of water in a basin until its temperature is above one hundred and ten (110) degrees Fahrenheit, then add cold water slowly; at the moment the scale of the thermometer placed in the basin marks one hundred and ten (110) degrees, pour a spoonful of the oil to be tested into the water; thus the oil is brought to one hundred and ten degrees; then pass a wisp of burning paper over the oil; if the escaping vapor catches fire the oil is dangerous, but if not then it is safe."

SEC. 5. That cases arising under this act shall be tried before the Superior Court of this State.

SEC. 6. Repeals conflicting laws.

Approved October 24, 1870.

MICHIGAN.

AN ACT to provide for the inspection of illuminating oils, manufactured from petroleum or coal oils.

SECTION 1. *The People of the State of Michigan enact*, That upon the application of five or more citizens of any county within this State, wherein any illuminating oils are manufactured and refined from petroleum or coal oils, for the purpose of burning the same in any kind of lamp, as an illuminator, or where the same, or a mixture of petroleum and coal oil is sold for that purpose, the judge of the circuit court within whose judicial district the said county is embraced, shall appoint a suitable person who is not interested in manufacturing, dealing, or vending any or either of said oils, whose duty it shall be to examine and test the quality of all petroleum or coal oils that he shall be requested to examine and test by any manufacturer, refiner, vendor, or dealer; and if upon such testing or examination the oils or fluid so tested shall meet the requirements hereinafter specified, he shall fix his brand or device, namely: "Approved," with the date, over his official signature, upon the package, barrel, or cask containing the same, and it shall be lawful for any manufacturer, vendor, or dealer, to sell the same as an illuminator; but if the oil so tested shall not meet said requirements, he shall mark, in plain

letters, on said package, cask, or barrel, over his official signature, the words "rejected for illuminating purposes," and it shall be unlawful for the owner thereof to sell said oil for illuminating purposes.

SEC. 2. It shall be the duty of the inspector to provide himself, at his own expense, with the necessary instruments and apparatus for testing the quality of said illuminating oils, and, when called upon for that purpose, to promptly inspect all oils hereinbefore mentioned, and to reject as dangerous all petroleum or coal oils, which at the temperature of one hundred and ten degrees, Fahrenheit's thermometer, will emit an explosive gas, or take fire on applying thereto or plunging therein a well-lighted match: *Provided*, The quantity of oil used in this test shall not be less than half a pint. And it shall be the duty of said inspector to designate by his brand the temperature at which said oil will ignite.

SEC. 3. All illuminating oils manufactured or refined in this State, shall be inspected before removed from the manufactory or refinery. And if any person or persons, whether manufacturer, vendor, or dealer, shall sell, or attempt to sell, to any person in this State, any illuminating oils, whether manufactured in this State or not, before having the same inspected as provided in this act, he shall be subject to a penalty in any sum not exceeding five hundred dollars; and if any manufacturer, vendor, or dealer of either or any of said illuminating oils, shall falsely brand the package, cask, or barrel containing the same, as provided in the first section of this act, or shall use packages, casks, or barrels having the inspector's brand thereon, without having the oil inspected, he shall be subject to a penalty in any sum not exceeding five hundred nor less than one hundred dollars, or be imprisoned in the county jail not exceeding six months, or both, at the discretion of the court.

SEC. 4. The several inspectors provided for [in] this act are hereby empowered, if necessary to the convenient and prompt despatch of their respective duties, to appoint a suitable number of deputies, for whose official acts they shall be accountable, which deputies are hereby empowered to perform the duties of inspection, and shall be liable to the same penalties as the inspector.

SEC. 5. Every person appointed inspector or deputy inspector shall, before he enters upon the discharge of the duties of his office, take an oath or affirmation to support the constitution of the United States and the State of Michigan, and to discharge the duties of inspector with fidelity. He shall also execute a bond to the State of Michigan, in such sum and with such surety as shall be approved by the judge of the circuit court where appointed, conditioned for the faithful performance of the duties imposed on him by this act, which bond shall be for the use of all persons aggrieved by the acts or neglect of said inspector; and the same shall be filed with the clerk of the county where the inspectors reside.

SEC. 6. The term of office of an inspector shall be for two years; and every inspector or deputy inspector shall, upon the requisition of any manufacturer, dealer, or vendor of the oils herein mentioned, proceed without unnecessary delay to the inspection thereof; and said inspector shall be entitled to demand and receive from the owner or the party calling upon him, the sum of ten cents for each and every package, cask, or barrel inspected and branded by him; and it shall be the duty of every inspector to keep a true and accurate record of all oils so inspected and branded by him, and by his deputies,

which record shall state the date of inspection, the number of gallons or barrels, and the name of the person for whom inspected, and the record shall be open to the inspection of any and all persons interested. And it shall be the duty of every deputy inspector, within four days after the inspection of any oils hereinbefore mentioned by him, to make a true return thereof to his principal.

SEC. 7. No inspector or deputy inspector shall, while in office, traffic directly or indirectly in any article which he is appointed to inspect. For the violation of this section, he shall be liable to a penalty not exceeding ten hundred dollars.

Approved April 3, 1869.

AN ACT to amend sections one, two, and six of an act entitled "An act to provide for the inspection of illuminating oils manufactured from petroleum or coal oils," approved April third, eighteen hundred and sixty-nine, being act number one hundred and twenty-eight, of the session laws of eighteen hundred and sixty-nine, and to add thereto a new section, to stand as section eight of said act.

SECTION 1. *The People of the State of Michigan enact*, That sections one, two, and six of an act entitled "An act to provide for the inspection of illuminating oils manufactured from petroleum or coal oils," approved April third, eighteen hundred and sixty-nine, being act one hundred and twenty-eight, of the session laws of eighteen hundred and sixty-nine, be and the same are hereby amended so as to read as follows:

SECTION 1. *The People of the State of Michigan enact*, In any county of the State wherein any illuminating oils are manufactured for the purpose of burning in any kind of lamp as an illuminator, or where the same is sold for that purpose, the Governor, upon the application of five or more persons, residents of said county, shall appoint a suitable person, who is not interested in manufacturing, dealing, or vending any or either of said oils, whose duty it shall be to examine and test the quality of all such oils that he shall be requested to examine and test by any manufacturer, vendor, or dealer, and if, upon such testing or examination, the oils shall meet the requirements hereinafter specified, he shall fix his brand or device, viz.: "Approved," with the date, over his official signature, upon the package, barrel, or cask containing the same, and it shall be lawful for any manufacturer, vendor, or dealer to sell the same as an illuminator; but if the oil so tested shall not meet said requirements, he shall mark in plain letters on said package, cask, or barrel, over his official signature, the words "Rejected for illuminating purposes," and it shall be unlawful for the owner thereof to sell such oil for illuminating purposes.

SEC. 2. It shall be the duty of the inspector to provide himself, at his own expense, with the necessary instruments and apparatus for testing the quality of said illuminating oil, and, when called upon for that purpose, to promptly inspect all oils hereinbefore mentioned, and to report as dangerous all oils which, at the temperature of one hundred and ten degrees of Fahrenheit's thermometer, will emit an explosive gas, or take fire on applying thereto or plunging therein a well-lighted match: *Provided*, The quantity of oil used in this test shall not be less than half a pint; and it shall be the duty of said inspector to designate by his brand the temperature at which said oil will ignite.

SEC. 6. The term of office of an inspector shall be for two years; and every inspector

or deputy inspector shall, upon the requisition of any manufacturer, dealer, or vendor of the oils herein mentioned, proceed, without unnecessary delay, to the inspection thereof, and said inspector shall be entitled to demand and receive from the owner or the party calling upon him, the sum of four cents for each and every package, barrel or cask inspected and branded by him; and it shall be the duty of every inspector to keep a true and accurate record of all oils so inspected and branded by him and by his deputies, which record shall state the date of inspection, the number of gallons or barrels, and the name of the person for whom inspected, and the record shall be open to the inspection of any and all persons interested. And it shall be the duty of every deputy inspector, within four days after the inspection of any oils hereinbefore mentioned, by him, to make a true return thereof to his principal.

SEC 8. It shall not be necessary for any person to have inspected, under the provisions of this act, oils brought into this State from any other of the United States, which have been inspected under the laws of any other such State, if the package, cask, or barrel in which the same is brought into this State shall bear a brand or device of the State inspector or deputy State inspector of such other State, showing that the contents thereof have been approved and stand a fire test of one hundred and ten degrees of Fahrenheit's thermometer. And if any person within this State shall brand, mark, or place upon any package, cask, or barrel, any device with intent to show that the contents thereof have been inspected in any other State, or if any vendor, dealer, or manufacturer of any or either of said illuminating oils shall use packages, casks, or barrels having the brand of the inspector of another State thereon, without having the oil inspected, or without the same having been inspected as in this section specified, the person so offending shall be subject to a penalty in any sum not exceeding five hundred dollars, nor less than one hundred dollars, or be imprisoned in the county jail not exceeding six months, or both, at the discretion of the court.

SEC. 2. This act shall take immediate effect.

Approved March 22, 1871.

MISSOURI.

INSPECTION OF PETROLEUM.

AN ACT to regulate the inspection of petroleum oils or fluids, or any products thereof, sold or manufactured for illuminating purposes.

SECTION
1. Governor to appoint inspector of coal and petroleum oils for certain cities.
2. Mode of inspecting and branding such oils.
3. Additional brands to be affixed by inspector.
4. Penalty for selling uninspected oils or meddling with brands of inspector.
5. Prosecutions for such offences to be by indictment; fines collected disposed of, how.
6. Deputy inspectors may be appointed.

SECTION
7. Oaths to be taken by inspectors and bonds to be given to county court.
8. Term of office and compensation of inspectors.
9. Records to be kept by them, and annual report to be made to Governor.
10. Inspectors and deputies prohibited from participating in manufacture or sale of such oils, or applying any to their own use.
11. Former acts in relation to such inspection repealed.

Be it enacted by the General Assembly of the State of Missouri, as follows:

SECTION 1. The Governor shall appoint for each of the cities of St. Louis, Hannibal, St. Joseph, and Kansas City, and such other cities or towns as shall by the city or town authorities petition to him therefor, an inspector of coal oil, carbon oil, petro-

leum oil, kerosene, gasoline, or any product of petroleum used for illuminating or burning fluids, by whatever name known, which may be manufactured or offered for sale in this State. Said inspector shall be a competent and qualified person, and shall, at his own expense, provide himself with the necessary instruments for the testing and gauging or weighing the quality and quantity of any such illuminating oils or fluids.

SEC. 2. It shall be the duty of the inspector, when called upon for that purpose by the owner, manufacturer, or dealer of any of said illuminating oils or fluids, promptly to inspect or test and gauge the same within the city or town for which he is appointed. The inspector shall in all cases take the oil or fluid for test from the package which is intended to be branded, and in no case shall he mark or brand any package before having first inspected or tested the contents thereof; and the quantity used for testing the fire test of such illuminating oil or fluid shall not be less than half a pint, and shall be ascertained by applying thereto a well-lighted match, and all such illuminating oils or fluids that will ignite or burn at a less temperature than one hundred and ten degrees Fahrenheit, he shall brand "rejected," and all that will stand the fire test of one hundred and ten degrees Fahrenheit, he shall brand "approved standard fluid."

SEC. 3. The inspector shall, in addition to the brand in section two provided, affix his brand or device upon each package by him inspected, designating first: his name and place and date of inspection, thus: "—— inspector of ——, 18—;" second, the fire test, thus, "ignited at —— temperature;" third, if the fluid inspected has no fire test, then the specific gravity of same, thus: "specific gravity ——;" fourth, the capacity of the package in gallons and the out, thus: "gallons ——, outs ——;" *provided*, that if hereafter weight shall be established for the ascertaining of the quantity in place of gauging by gallons, then the inspector shall mark on the package inspected by him, the gross weight in place of gallons as provided for in this section. The inspector shall, in addition to the aforesaid, affix his brand on all packages by him found to contain fluids that have no fire test as aforesaid, with the words "highly inflammable."

SEC. 4. If any person, manufacturer or dealer, shall sell to any person whatsoever in this State, before having the same inspected, any of the said illuminating oils or fluids before first having the same inspected as provided in this act, he shall, on conviction thereof, be fined in any sum not exceeding three hundred dollars; and if any manufacturer or dealer of said illuminating oils or fluids shall, with intent to deceive or defraud, alter or erase the inspector's brand to indicate a different fire test, gravity, or quantity than is found by the inspector, or shall use with such intent packages having any inspector's brand thereon, without having the contents actually inspected, shall, on conviction, be fined in any sum not exceeding fifty dollars for each such offence.

SEC. 5. All prosecutions for fines and penalties under the provisions of this act shall be by indictment in any court of competent jurisdiction, and when collected, shall be paid into the treasury of the county where the offence is committed, one-fourth of which shall be paid to the informer, and three-fourths to be paid to the common school fund.

SEC. 6. The inspectors are hereby empowered, if necessary to the convenient despatch of their respective duties, to appoint competent deputies, for whom they shall and are hereby made respectively responsible and accountable; which deputies are hereby empowered to perform the duties of inspector, and shall be liable and are hereby made liable to the same penalties as the inspector.

SEC. 7. Every person appointed inspector, shall, before he enters upon the duties of his office, take an oath or affirmation to support the Constitution of this State and of the United States, and to perform the duties of his office with fidelity; he shall also execute a good and sufficient bond to the county court of the county in which he may reside, in such sum and with such securities as shall be approved by said court, conditioned for the faithful performance of the duties herein imposed on him, which bond shall be for the use of all persons aggrieved by the acts or neglects of such inspector or his deputy.

SEC. 8. The term of office for inspector shall be for one year, and for his compensation he shall be entitled to demand and receive from the owner of the illuminating oils or fluids inspected or tested, and gauged or weighed, and marked and branded as in this act provided, twelve cents for each barrel, and six cents for each smaller package.

SEC. 9. The respective inspectors appointed under this act shall keep a correct record of all illuminating oils or fluids inspected, which shall be open to inspection by all persons interested, and report annually to the Governor the number of barrels and smaller packages inspected.

SEC. 10. No inspector or deputy inspector shall, while in office, be interested directly or indirectly in the manufacture or vending of any of the said illuminating oils or fluids to be inspected under this act, nor shall he for the purpose of inspecting, testing or gauging, take away nor appropriate any part of said illuminating oils or fluids to his own use, or for the use of any other person, under penalty of five hundred dollars, to be recovered by an indictment in the manner provided for in section five of this act.

SEC. 11. Chapter one hundred and five of the General Statutes, and all other acts and parts of acts in relation to inspection of coal and petroleum oils, entitled "An act for the inspection of coal oil or petroleum oils, approved March the eighteenth, eighteen hundred and sixty-seven, and amended and approved March twenty-fourth, eighteen hundred and sixty-eight," are hereby repealed.

Approved March 24, 1870.

LOUISIANA.

Board of Health of New Orleans.

OFFICE BOARD OF HEALTH, STATE OF LOUISIANA,
NEW ORLEANS, July 2, 1870.

Whereas, The frequency of accidents from the use of oils and fluids produced from coal and petroleum, has rendered it necessary, in the belief of the Board of Health, that the public should be advised as to which of said oils and fluids it deems *dangerous* for common use, and which it considers *safe*, and thus, as far as possible, protect the citizen; the said Board publishes: That it considers no such oil or fluid safe whose flashing point is below 110° Fahrenheit; that is, that no such oil or fluid which gives off an inflammable gas or vapor at a lower temperature than 110° Fahrenheit is safe from explosion, or from its readiness to take fire. There are many such oils and fluids which are inflammable at all temperatures, and this Board consider such oils and fluids dangerous, principally and specially from their excessive inflammability, while explosions from such highly inflammable oils and fluids occur frequently. Such oils or fluids as these, if

used at all, should be used with great care and never be left in the hands of children; nor should they be used except in metallic lamps. These oils and fluids are generally, unless artificially colored, without color, and look like water. These are the lighter products of coal and petroleum.

Between these highly inflammable oils and fluids and the safe oils, is another class of oils or fluids, generally of a yellowish color, dangerous both from their inflammability and liability to explosion. These classes include a very large proportion of all the oils and fluids sold in our markets, and the public is cautioned to avoid the use of them entirely. All lamps should be filled every day, by daylight. Most explosions occur when the lamp is but partly filled.

While this Board has adopted the "flashing point 110° Fahrenheit," as the lowest standard practically safe from most ordinary accidents, it does not wish to be understood to imply that even with oils or fluids at or above the standard great care and caution should not be used. It is, however, the standard adopted in several of the States. The Board specially cautions the public against the use of oil or fluid, produced from coal or petroleum, which is marked "below Board of Health standard flashing point, 110°."

Of the eleven accidents officially reported upon to the Board of Health since May 26, three were caused by oils liable both to take fire and explode; and eight were caused by fluids of the class dangerous by reason of excessive inflammability.

C. B. WHITE, M.D.,
President.

OFFICE OF BOARD OF HEALTH,
159 CANAL STREET, NEW ORLEANS,
July 3, 1870.

At a meeting of the Board of Health of the State of Louisiana, held on Friday, the 1st day of July, 1870, it was

Resolved, That section twenty-two of the sanitary ordinance, adopted by this Board on the 18th day of May, 1870, be amended and re-enacted, so as to read as follows:

SEC. 22. It shall hereafter be unlawful for any person or persons, firm or corporation, to sell, give, or deliver (except as a common carrier), any kerosene oil or other illuminating oil or oils, or any illuminating fluid or fluids, derived wholly or in part from coal or petroleum, except in the manner hereinafter specified; that is, if the quantity so sold, given, or delivered, shall exceed five gallons in amount, the person or persons, firm or corporation, making such sale, gift, or delivery, shall before actual delivery thereof, place, or cause to be placed, such oil or oils, fluid or fluids, in wooden casks or metallic vessels, of such quality and structure as to be thoroughly tight and secure; if, however, the quantity so sold, given, or delivered, shall not exceed five gallons in amount, then the person or persons, firm or corporation, making such sale, gift, or delivery, shall, before actual delivery thereof, place, or cause to be placed, such oil or oils, fluid or fluids, in tin or other metallic vessels, which shall be thoroughly tight and secure; and any person or persons, firm or corporation, making any such sale, gift, or delivery (except as a common carrier), shall, before actual delivery thereof, whatever the amount of such sale, gift, or delivery may be, attach, or cause to be attached, securely to the cask or vessel containing such oil or oils, fluid or fluids so sold, given, or to be delivered, a card, label, or tag, upon which shall be printed, in plain type, not less than three-eighths of

an inch in height, the correct name and brand of such oil or oils, fluid or fluids, in said cask or vessel contained; also, the words and figures following: "Inflammable at — degrees Fahrenheit" (naming the degrees), or "Inflammable at any temperature" (as the case may be); also the words and figures following: "Explosive at — degrees" (naming the degrees), or "Non-explosive" (as the case may be); also, the words following: "Board of Health Standard Flashing Point, 110 degrees." There shall also be upon said card, label, or tag, the name of the person or persons, firm or corporation, making such sale, gift, or delivery, with the street and number where such person or persons, firm or corporation, does business. Any person or persons, firm or corporation, making any sale, gift, or delivery of any such oil or oils, fluid or fluids, otherwise than as hereinbefore specified, shall be liable to a penalty not exceeding fifty dollars; and any person or persons, firm or corporation, neglecting or failing to attach or cause to be attached securely to the cask or vessel containing any such oil or oils, fluid or fluids, the card, label, or tag as aforesaid, or to place thereon the words and figures, as hereinbefore specified, shall be liable to a penalty not exceeding fifty dollars; and any person or persons, firm or corporation, who shall attach or suffer to be attached to any such cask or vessel any card, label, or tag, which shall not be, in all respects, a true representation of the contents of such cask or vessel, or which shall not be true in every other respect, shall be liable to a penalty of fifty dollars. The acts and doings of employés of any person or persons, firm or corporation, in all the matters and things referred to in this section, shall be considered as the acts and doings of such person or persons, firm or corporation. This section shall not be construed as applicable to actual sales, gifts, or deliveries of oil or oils, fluid or fluids, to be shipped beyond the territory included in the district under the sanitary control of the Board of Health.

C. B. WHITE, M.D.,
President.

S. C. RUSSELL, M.D.,
Secretary.

STATE LAW ON COAL OILS RECOMMENDED FOR ADOPTION BY THE BOARD OF HEALTH OF NEW ORLEANS.

AN ACT to provide for the inspection and designation of coal oils and illuminating oils or fluids, derived wholly or in part from coal or petroleum; to regulate the sale or disposition of the same; to prohibit the sale or disposition of illuminating oils or fluids dangerous to life and property, and to prescribe penalties for violations of this act.

SECTION 1. *Be it enacted by the Senate and House of Representatives of the State of Louisiana, in General Assembly convened*, That in every city or town in the State of Louisiana containing, according to the census of the United States, for the year one thousand eight hundred and seventy, not less than two thousand inhabitants (except in the city of New Orleans), the Mayor, by and with the consent of the Council, shall, within thirty days after the promulgation of this act, appoint one or more suitable persons to be inspectors of coal oils, and of all illuminating oils or fluids, derived wholly or in part from coal or petroleum, which said person or persons shall, before entering upon the discharge of the duties of such office, be duly sworn to truly and faithfully perform all the duties required of such inspector or inspectors by this act.

SEC. 2. *Be it further enacted, etc.*, That in and for the city and parish of Orleans, the Board of Health of the State of Louisiana shall appoint or employ one or more suitable persons to be inspectors in and for said city and parish, of coal oils and all illuminating oils or fluids, derived wholly or in part from coal or petroleum, which said person or persons shall subscribe to a like oath as provided in section one of this act, and shall perform the duties prescribed in this act for inspectors, and likewise such other duties as may at any time be required by the said Board of Health for the more perfect accomplishment of the purposes of this act.

SEC. 3. *Be it further enacted, etc.*, That it is hereby made the duty of the inspectors appointed under this act, to inspect, upon notice received in writing from the proper party, all coal oils, or illuminating oils or fluids, derived wholly or in part from coal or petroleum, and to ascertain by Tagliabue's pyrometer, or by some other instrument, approved by the Board of Health, the flashing point of such oils or fluids, in degrees of Fahrenheit's thermometer, and to mark upon each cask or vessel containing such oil or fluid, in plain and distinct letters, characters or figures, by stencil plate, or otherwise, as the Board of Health may direct, the name of the inspector making such inspection, the place and date of such inspection, and the flashing point, in degrees as aforesaid, of the oil or fluid in such cask or vessel contained.

SEC. 4. *Be it further enacted, etc.*, That upon such inspection being completed, the inspector making the inspection shall be entitled to have and to receive from the party requiring such inspection to be made, fees at the rate of one-half cent per gallon for each and every gallon of oil or fluid so inspected at such inspection, and no more. The fees or compensation of the inspector or inspectors in and for the city and parish of Orleans shall be established by the Board of Health, and shall be paid as provided for in the first clause of this section.

SEC. 5. *Be it further enacted, etc.*, That it is hereby declared to be unlawful for any person, firm, company or corporation to sell or expose for sale, or dispose of (except as a common carrier) any coal oil, or any illuminating oil or fluid, derived wholly or in part from coal or petroleum, until the same shall have been inspected and marked as provided in section three of this act; and any person, firm, company or corporation violating any of the provisions of this section shall be liable to a penalty not to exceed the sum of two hundred dollars for each offence; and shall be debarred from any suit at law to recover the price of such oil or fluid from the vendee thereof.

SEC. 6. *Be it further enacted, etc.*, That it shall be hereafter unlawful for any person, firm, company or corporation to sell, give or deliver (except as a common carrier) or offer or expose for sale, for illuminating purposes, any coal oil, or illuminating oil or fluid, derived wholly or in part from coal or petroleum, whose flashing point shall be at less than the temperature of one hundred and ten degrees, to be ascertained as provided in section three of this act. Any person, firm, company or corporation violating, in any manner, any of the provisions of this section shall be liable to a penalty not exceeding the sum of two hundred dollars for each and every offence; and it is further provided, that in the event of any injury or damage to person or property, resulting from, or caused by such oil or fluid—unless such injury or damage be shown clearly to be the result of carelessness or negligence on the part of the person so injured or damaged in person or property—that such person shall have his action, in damages, against the

person, firm, company or corporation selling, giving or delivering (except as a common carrier) such oil or fluid, for the full amount of such injury or damage, and costs of action.

SEC. 7. *Be it further enacted, etc.*, That it is hereby declared to be unlawful for any person, firm, company or corporation to sell, or give, or deliver (except as a common carrier) any illuminating oil or fluid, derived wholly or in part from coal or petroleum, and known commonly in the market as naphtha, deodorized naphtha, gasoline or benzine; and for any and each violation of this section the person, firm, company or corporation so violating it, or any part of it, shall be liable to a penalty of five hundred dollars.

SEC. 8. *Be it further enacted, etc.*, That it is hereby made the duty of the district attorney of the parish (except the parish of Orleans) in which any offence against this act shall have been committed, to bring suit by ordinary action, in the name of the State of Louisiana, against the offender in any civil court of competent jurisdiction, for the recovery of the penalty incurred by such offence.

The Board of Health of the State of Louisiana shall prosecute, in its own name, by ordinary action, before any civil court of competent jurisdiction, in the parish of Orleans, for the recovery from the offender of the penalty incurred for any offence against any of the provisions of this act in the city and parish of Orleans; and all penalties collected under this act shall be paid into the treasury of the Board of Health, and become part of the funds of said board.

SEC. 9. *Be it further enacted, etc.*, That in order the more effectually to carry out the provisions of this act, and to prevent violations of sections five, six and seven of this act, the Board of Health of the State of Louisiana, and the district attorneys of the respective parishes of this State, may, at the time of filing, or at any time in the progress of any suit, obtain a writ of injunction forbidding and restraining the defendant or defendants in such action from doing or suffering to be done any of the acts on account of which such action was brought. And such district attorney and the Board of Health shall be dispensed with furnishing the bond ordinarily required by law of plaintiff in obtaining the issuance of such writ.

SEC. 10. *Be it further enacted, etc.*, That all laws, or parts of laws, in conflict with this act are hereby repealed.

NEW YORK.

Chap. 773.

AN ACT to regulate the storage and keeping of crude petroleum, earth or rock oil, or any of its products, within the corporate limits of any city in the State of New York.

Passed June 15, 1865; three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. No person shall keep on sale or store in any place or building within the corporate limits of any city in the State of New York, any crude petroleum, earth or rock oil, or any of its products, except under the following provisions:

§ 2. Crude petroleum, earth or rock oil, or any of its products, may be stored in detached and properly-ventilated warehouses, the exterior walls of which shall be of stone, brick, or iron, specially adapted to that purpose by having raised sills at least two feet high, or the ground floor of which shall be at least two feet below the level of the street or adjoining land, in such manner as to effectually prevent the overflow of such substances beyond the premises where the same may be kept or stored, which said warehouses shall not be occupied in any part as a dwelling; and if less than fifty feet from any adjacent building, the same must be separated by a brick or stone wall, at least ten feet in height and sixteen inches thick.

§ 3. No refined petroleum, kerosene, or machinery oils shall be kept upon sale or stored within the corporate limits of any city in the State of New York, the fire test of which shall be less than one hundred degrees Fahrenheit; said test shall be determined by authorized inspectors, using G. Tagliabue's or other improved instruments; the barrels or packages containing the same to be legibly stamped or marked with said inspector's official stamp or mark. When stored above the cellar or basement of any store or building, and in barrels of not over forty-five gallons each, or metallic vessels or tanks, for convenience of retailing, the quantity of such refined oil so stored shall not exceed the contents of ten barrels. When packed in hermetically-sealed metallic packages the quantity so stored shall not exceed one hundred barrels. When stored in cellars or basements, surrounded by walls of brick or stone, and at least two feet below the level of the sidewalk, street, or land adjacent, the quantity so stored shall not exceed the contents of one hundred and fifty barrels, unless stored in warehouses specially adapted for that purpose, as provided under section two of this act; provided, also, that no quantity of said oils greater than five barrels shall be stored or kept in any building occupied in any part thereof as a dwelling. Benzine or naphtha may be kept or stored under the provisions of this section as follows: When stored above the cellar or basement, the quantity so stored shall not exceed the contents of ten barrels; when stored in a building any part of which may be occupied as a dwelling, the quantity so stored shall not exceed three barrels.

§ 4. In no case shall any of the articles recited in this act be allowed to remain on the sidewalk beyond the front line of any building or in the streets a longer time than is actually requisite for the storage, shipment, or delivery of the same, nor after sunset.

§ 5. It shall be the duty of inspectors of buildings, or other proper authorities, in addition to the duties now imposed upon them by law, to make an examination of all premises wherein either of the said articles mentioned in this act may be kept or stored, and to report any violation of said act at once to the proper authorities hereinafter named to enforce the same.

§ 6. Any person who shall offend against any of the provisions of this act shall, if the offence be against the before-noted prescribed fire test and marking for refined petroleum, kerosene, and machinery oil, pay a fine not less than fifty dollars nor more than five hundred dollars; and for the excess over quantity of said merchandise herein defined and permitted, a fine of two hundred and fifty dollars shall be paid for each day such excess was made; and for any of said merchandise improperly incumbering the highways, as noted in section four of this act, a fine of twenty-five dollars shall be paid for each day such incumbrance remain after notified to remove the same.

§ 7. The mayor and common council or other proper authorities in any city of the

State of New York not provided for by this act, shall, by ordinances or resolution, provide for the proper enforcement of the provisions of this act, and such fines as are imposed and collected after the payment of the necessary expenses of prosecution are to be devoted to the poor in the places where such fines shall be recorded* except in the cities of Brooklyn and New York, where such fines shall go to the widows and orphans' fund of the fire department of said cities.

§ 8. For the purpose of enforcing the several provisions of this act in the city of New York, there shall be appointed by the superintendent of buildings, appointed under chapter three hundred and fifty-six of the Laws of eighteen hundred and sixty-two, three inspectors in and for the city of New York, whose duty it shall be to report forthwith to the said superintendent of buildings all violations of the several provisions of this act in said city as well as all violations of chapter two hundred and ninety-one of the laws of eighteen hundred and forty-six, entitled "An act in relation to the keeping of gunpowder, saltpetre, and certain other substances in the city of New York," passed May thirteenth, eighteen hundred and forty-six, and said superintendent of buildings is hereby directed to prosecute all violations of this act committed in said city, as well of the act above named, passed May thirteenth, eighteen hundred and forty-six, in the same manner as now provided by chapter three hundred and fifty-six of the Laws of eighteen hundred and sixty-two, for the prosecution of building law violations.

The officers named under this section shall hold office respectively for the term of four years from the passage of this act, and shall be paid a salary of one thousand dollars per annum; and the amount of all penalties recovered in said city, after the payment of all costs and expenses incurred, shall be paid to the treasurer of the fire department fund in said city, for the benefit of said fund.

§ 9. For the purpose of enforcing the several provisions of this act in the city of Brooklyn, there shall be nominated by the mayor, and confirmed by the common council of said city, a competent and experienced person as special warden, whose duty it shall be to guard the said city against fires and explosions from petroleum, earth or rock oil, or the products thereof, or from benzole, benzine, naphtha, kerosene, camphene, or burning fluid of any kind, by requiring obedience to the ordinances of said city, and the laws of this State in relation to the storage, manufacture, or keeping for sale of such materials within said city, and said special warden shall have power at all times to enter all manufactories, warehouses, buildings, sheds, yards, and grounds within said city used for the manufacture, storage, or sale of any of the materials mentioned in this section, and examine such materials kept, manufactured, or sold therein, and the manner in which the same are kept or secured, and the owners, tenants, or occupants of all such manufactories, warehouses, buildings, sheds, yards, and grounds within said city shall permit and allow the said special warden at all times to enter the same.

The said common council shall have the power to regulate and prescribe the duties and compensation of such special warden, and to fix his term of office.

§ 10. This act shall not apply to any place or tract of land in this State where the oil springs may be discovered and worked.

§ 11. This act shall take effect on the first day of May next—*New York Statutes at Large, volume* 6, *General Statutes*, 1863,-'64,-'65,-'66.

* So in the original.

Chap. 872.

AN ACT to amend an act entitled "An act to regulate the storage and keeping of crude petroleum, earth or rock oil, or any of its products within the corporate limits of any city in the State of New York," passed June fifteenth, eighteen hundred and sixty-five.

Passed May 4, 1866.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. The third section of the act entitled "An act to regulate the storage and keeping of crude petroleum, earth or rock oil, or any of its products, within the corporate limits of any city in the State of New York," passed June fifteenth, eighteen hundred and sixty-five, is hereby amended so as to read as follows:

"§ 3. No refined petroleum or kerosene oils shall be kept upon sale or stored within the corporate limits of any city in the State of New York, the fire test of which shall be less than one hundred and ten degrees Fahrenheit; said test shall be determined by authorized inspectors, using G. Tagliabue's or other improved instruments, the barrels or packages containing the same to be legibly stamped or marked with said inspector's official stamp or mark. When stored above the cellar or basement of any store or building in barrels of not over forty-five gallons each, or metallic vessels or tanks, for convenience of retailing, the quantity of such refined oil so stored shall not exceed the contents of ten barrels; when packed in hermetically sealed metallic packages, the quantity so stored shall not exceed one hundred barrels; when stored in cellars or basements, surrounded by walls of brick or stone, at least two feet below the level of the sidewalk, street, or land adjacent, the quantity so stored shall not exceed the contents of one hundred and fifty barrels, unless stored in warehouses specially adapted for that purpose, as provided under section two of this act; provided, also, that no quantity of said oils greater than five barrels shall be kept or stored in any building occupied in any part thereof as a dwelling. Benzine or naphtha may be kept or stored under the provisions of this section as follows: When stored above the cellar or basement, the quantity so stored shall not exceed the contents of ten barrels; when stored in the cellar or basement, the quantity so stored shall not exceed the contents of ten barrels; when stored in a building, any part of which may be occupied as a dwelling, the quantity so stored shall not exceed three barrels, provided, nevertheless, that nothing in this act contained shall prevent the storage of crude or refined petroleum in wrought-iron tanks, detached from any building and specially adapted to that purpose, or in other tanks so constructed that the top shall be at least two feet below the level of the street or adjoining land, and covered with at least one foot of earth, when such tanks are appurtenant to or connected with a refinery, with the approval of the inspector of buildings, fire marshal, or other proper authorities."

§ 2. The seventh section of said act is hereby amended so as to read as follows:

"§ 7. The mayor and common council, or other proper authorities in any city in the State of New York, not provided for by this act, shall by ordinance or resolution provide for the proper enforcement of the provisions of this act, and such fines as are imposed and collected, after the payment of the necessary expenses of prosecution, are to be devoted to the poor in the places where such fines shall be collected, except in the cities of

Brooklyn and New York, where such fines shall go to the widows and orphans of the fire department of said cities, and except, also, in the city of Buffalo, where fines shall be paid by the officers collecting them to the treasurer of the firemen's benevolent association of the city of Buffalo, for the use and benefit of such association.

§ 3. This act shall take effect immediately.—*New York Statutes at Large*, chs. 877—1862–'64–'65–'66.

NEW YORK CITY.

AN ACT in relation to storage and the keeping of combustible material in the city of New York, the use and control of the fire alarm telegraph, the maintenance of fire hydrants, and other purposes connected with the prevention and extinguishment of fires therein, and imposing certain powers and duties upon the board of fire commissioners of the said city. Passed April 20, 1871; three-fifths being present.

(Being Chapter 742 of the Laws of New York for 1871.)

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. The following regulations are hereby established for storage and keeping and sale of combustible materials in the city of New York:

PETROLEUM, KEROSENE, ET CETERA.

§ 4. No person shall have, keep upon sale, or store in any place or building within the corporate limits of the city of New York, any crude petroleum, coal, or any similar oil, nor any of their products, either of which shall emit an inflammable vapor at a temperature below one hundred degrees Fahrenheit, except under the following provisions. These oils, or any of their products, may be stored in detached and properly ventilated warehouses, the outer walls of which shall be stone, brick, or iron, especially adapted for the purpose, by having raised sills at least two feet high, or the ground floor of which shall be at least two feet below the level of the street or adjoining yard, or so constructed as to actually prevent the overflow of such substances beyond the premises where the same may be kept or stored; which said warehouses shall not be occupied in any part as a dwelling; and if less than fifty feet from any adjacent dwelling, the same must be separated by a brick or stone wall at least ten feet in height and sixteen inches thick, constructed in such manner as said commissioners may prescribe, but the same may be stored in such other manner as said commissioners may designate under special permit issued therefor.

No refined petroleum, kerosene, coal, or similar oil, or any product thereof to be used for illuminating or heating purposes, which shall emit an inflammable vapor at a temperature below one hundred degrees Fahrenheit, shall be kept upon sale or stored within the corporate limits of the city of New York. All said articles shall be tested and their quality determined by sanitary surveyors authorized by said commissioners, using G. Tagliabue's instruments, or such other instruments as may be designated by said commissioners.

No refined petroleum, kerosene, gasoline, naphtha, or benzine, benzole, camphene or burning fluid, or products or compounds containing any of said substances, when temporarily placed above the cellar or basement of any building, and in barrels of not over forty-five gallons each, or in metallic vessels or tanks, shall exceed in the whole quan-

tity the contents of fifty of said barrels; provided, however, that the whole quantity of said refined oils that may be so kept or stored over night shall not exceed the contents of ten of said barrels, unless stored in the manner provided for storing crude petroleum; and when stored in cellars or basements surrounded by walls of brick or stone, and at least two feet below the level or grade of the sidewalk, street, or land adjacent, the whole quantity shall not exceed the contents of one hundred and fifty barrels, unless stored in warehouses specially adapted for that purpose, as required for the storage of crude petroleum under this section; provided, also, that no quantity of said oils greater than one barrel shall be stored or kept in any building occupied in any part thereof as a dwelling.

No refined petroleum, kerosene, gasoline, naphtha, benzine, benzole, camphene, burning fluid, or products or compounds containing any of said substances, shall be kept or stored, on or above the first story or floor of any building, exceeding in the whole quantity the contents of five barrels, of forty gallons each. In no case shall any of the articles named in this section be allowed to remain on the sidewalk beyond the front line of any building, or in or upon the streets, docks, piers, bulkheads, slips, highways, or public places, a longer time than is actually necessary for the removal or loading of the same; and said commissioners may establish and enforce general regulations, and issue such orders and special directions relative to the handling, lightering, carting, loading, unloading, and transportation of the several articles named under this section, as in their discretion shall be deemed necessary for the public protection; and said commissioners may issue special permits authorizing the keeping of any of the articles enumerated under this section in buildings, tanks, or structures fire-proof throughout, in such quantities, in such manner, and subject to such regulations as shall tend to secure the same against danger. No person shall sell at retail any kerosene or other product of petroleum, or any similar oil, to be used for heating or illuminating purposes, without first obtaining a license therefore from the said commissioners, to be issued with the consent of the mayor, under such rules and regulations as they may prescribe, which license shall be for the term of one year, and shall not be transferable; and for every such license, and for every renewal of the same, the said commissioners shall demand and receive the sum of ten dollars. Said license shall be posted in a conspicuous place in the store of the person or persons to whom the same is issued, and may be revoked for cause by said commissioners. Any person who shall sell any of the compounds above mentioned in this section without first obtaining a license therefor, shall forfeit and pay the sum of twenty-five dollars. In case any person is burned by the explosion of any compound, the sale of which is prohibited by any section of this act, or has not been subjected to sanitary survey or licensed as therein provided, and death ensues therefrom, the person found guilty of selling the same shall be deemed guilty of a felony, and upon conviction shall be punished by a fine of not less than one thousand dollars nor more than five thousand dollars, or by imprisonment in the State prison for a term not less than one year, nor more than five years; and in case of a bodily injury, the party injured may maintain an action for damages against the party violating the provisions of this act. And any dealer who shall present and deliver for sanitary survey a sample of oil different from and which does not represent the quality of oil actually kept by him or her for sale, and not taken from the actual stock being offered for sale, and of the same

quality therewith, shall forfeit and pay the additional sum of fifty dollars. If any fire insurance company organized under the laws of this State, or any insurance company of any other State, or any foreign insurance company authorized to do the business of insurance in this State, shall indorse upon any policy issued by them the right or privilege to keep, deal in, give away, sell, or use any article or compound of a combustible or explosive character, the sale of which is made unlawful by any act of the legislature of this State, or shall cause or permit such indorsement to be made by others upon their policies of insurance, they shall for each and every such offence forfeit and pay a fine of five hundred dollars.

PENALTIES.

§ 11. Any person, persons, or corporation, for the violation of, or non-compliance with, any of the several provisions of the several sections of this act, when the penalty is not therein specially provided, shall severally forfeit and pay a fine or penalty in the sum of fifty dollars for each and every such offence, or shall forfeit and pay the penalties respectively imposed under any of said sections, and shall also be severally liable for the removal, amendment, or abatement of any violation of, or non-compliance with, any requirement under said sections, and shall also be severally liable for the payment of the further penalty of the sum of fifty dollars for any violation of, or non-compliance with, any regulation, order, or special direction issued by said commissioners as authorized under this act. Said commissioners may, in their discretion, pay a portion of a fine or penalty, when collected, not to exceed one-half thereof, to an informer.

ENFORCEMENT OF LAW.

§ 12. The board of fire commissioners of the city of New York are hereby authorized, empowered, and specially charged with the duties of enforcing the several provisions of this act, and may incur any expense necessary and proper therefor; and as to the location of any matter, place, or thing under the several sections of this act, they shall severally be taken and construed to be located within, or apply to said city of New York; and said board of fire commissioners are hereby authorized and empowered to receive and collect all license fees herein mentioned, and to sue for, and shall have the exclusive right of recovery of, any and all penalties imposed under this act, and may sue for and recover and collect the same, with costs, in the manner provided for in actions under the Code of Procedure, and shall apply the same to the uses and purposes of the relief fund of the fire department of the city of New York; and said board of fire commissioners may, in their name, bring any suit or action authorized; and any action to recover any fee, fine, or penalty under this act may be brought in any of the district courts in said city; and the corporation attorney shall, under the direction of said commissioners, take charge of the prosecution of all suits or proceedings instituted for the recovery and collection of penalties, and the enforcement of the several provisions of this act; collect and receive all moneys upon judgments, suits, or proceedings so instituted; pay all costs and disbursements, and discontinue suits and proceedings, and execute satisfaction of judgments, upon payment of penalties, or costs, and in compliance with orders made in such suits and proceedings; shall keep a correct and accurate register of all suits and proceedings, and account for all moneys received and paid out thereon; and shall pay over to the treasurer of the relief fund herein created the

amount of all license fees, penalties, and moneys received and collected by him, after deducting the amount of all costs and disbursements actually made, provided that nothing herein contained shall be construed to increase or alter the compensation of the attorney of said board as now fixed, and the said commissioners are authorized to settle or compromise any such suit or judgment for less than the amount of the same, in case in their judgment they are satisfied that payment of the full amount cannot be collected.

§ 15. This act is hereby declared a public act, and all courts and tribunals, or any judge or justice, shall take cognizance thereof, and give force and effect to its several provisions; and all courts of civil jurisdiction in said city shall have jurisdiction over all suits or proceedings herein authorized to be brought; and upon the rendition of a verdict, report of a referee, or decision of a judge or justice, for the recovery of the amount of any penalty or penalties in any action brought therefor, shall give judgment for the amount of all penalties and costs, and for the removal, amendment, or abatement of any matter or thing as shall be proper and necessary to give force and effect to the several sections of this act.

All statutes heretofore in force in this State in any case provided for by this act, or inconsistent with its provisions, so far as the same relates to the city of New York, are hereby repealed; but such repeal shall not affect any right already existing, or accrued, or any liability already incurred by reason of any violation of any law heretofore existing, or any suit or proceeding already instituted under said laws, except as to the manner of conducting and enforcing the same; and all rights of action, given or secured by said laws, may be prosecuted in the manner provided by this act.

§ 16. This act shall take effect June first, eighteen hundred and seventy-one.

STATE OF NEW YORK, }
Office of the Secretary of State, } ss. :

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this twenty-eighth day of April, in the year one thousand eight hundred and seventy-one.

DIEDRICH WILLERS, JR.,
Deputy Secretary of State.

The importance of this subject is my only apology for having written so extended a report. It seemed very important that all the facts should be clearly set forth, both for the information of your Honorable Board and that of the public which is so deeply interested.

Respectfully submitted.

C. F. CHANDLER, Ph. D.,
Chemist to the Department of Health
of the City of New York.

March 18, 1871.

"M."

REPORT ON STABLES.

BUREAU OF SANITARY INSPECTION,
HEALTH DEPARTMENT,
NEW YORK, April 19, 1871.

To the Board of Health of the
Health Department,

EMMONS CLARK, *Secretary.*

In compliance with the resolution of the Board, on the 8th of February, 1871, calling for an inspection of all stables in the city of New York, and a report upon the condition of the same, I respectfully present the following summary of information obtained from a thorough sanitary survey and inspection made by the Inspectors and Assistant Inspectors of this Department.

In this survey, which occupied the greater portion of their time during a period of a month, they were instructed to examine with special reference:

(1.) To the relative condition in which such stables were kept, whether *good*, *bad*, or indifferently;

(2.) The character of their occupancy, such as company, private, livery, boarding, or sales stables;

(3.) Their sanitary equipment, such as sewerage, receptacles for manure, etc.; and

(4.) The frequency with which manure was removed from them, whether daily, weekly, or semi-monthly; together with such other con-

ditions and facts as might seem to bear upon, or affect the ever-important interests of the public health.

From this inspection it appears that the whole number of stables in the city of New York, is 6,034. Of these, 3,151 are reported as being in good condition; 1,083 as in decidedly bad condition, and 1,800 as indifferently kept.

Two thousand seven hundred and fifty-four of these stables are provided with proper sewer connection; and 3,280 are not so provided, of which latter class 418 are located in the Sixteenth Inspection District (W. Fifty-ninth street to Spuyten Duyvil Creek), which is, at present, to a great extent unsewered.

Four thousand three hundred and seventy-five of these stables are furnished with manure vaults or other sufficient receptacles; and 1,659 are not so furnished. The manure is removed daily from only 253 stables.

As regards the occupancy of these stables, nine are occupied by horses belonging to the General Government; 263 by companies and departments of the municipal service; 342 as livery; 4,157 private; 90 as boarding, and 25 as sales stables; 1,166 are classed as "groups" or collections of single stalls, leased by individual owners of horses.

This stable census reveals the fact that 38,272 horses and 1,845 cows are stabled within the corporate limits of the city.

It is estimated that from these 38,272 horses about 1,146 cart loads of manure are produced daily, or an aggregate of 418,290 loads per year. This estimate includes the soiled straw, which, in bulk, forms about two-thirds of the quantity produced.

The above statistics are herewith presented in a tabular form:

Good.	Bad.	Indifferent.	With Sewer Connection.	Without Sewer Connection.	With Manure Vaults or Receptacles.	Without Manure Vaults or Receptacles.	Government.	Company and Department.	Livery.
3,151	1,083	1,800	2,754	3,280	4,375	1,659	9	263	324

Private.	Boarding.	Sales.	Groups.	Horses.	Cows.	Manure Removed Daily, No. of Stables.	Total No. of Stables.
4,157	90	25	1,166	38,272	1,845	253	6,034

Respectfully submitted.

MOREAU MORRIS, M.D.,
City Sanitary Inspector.

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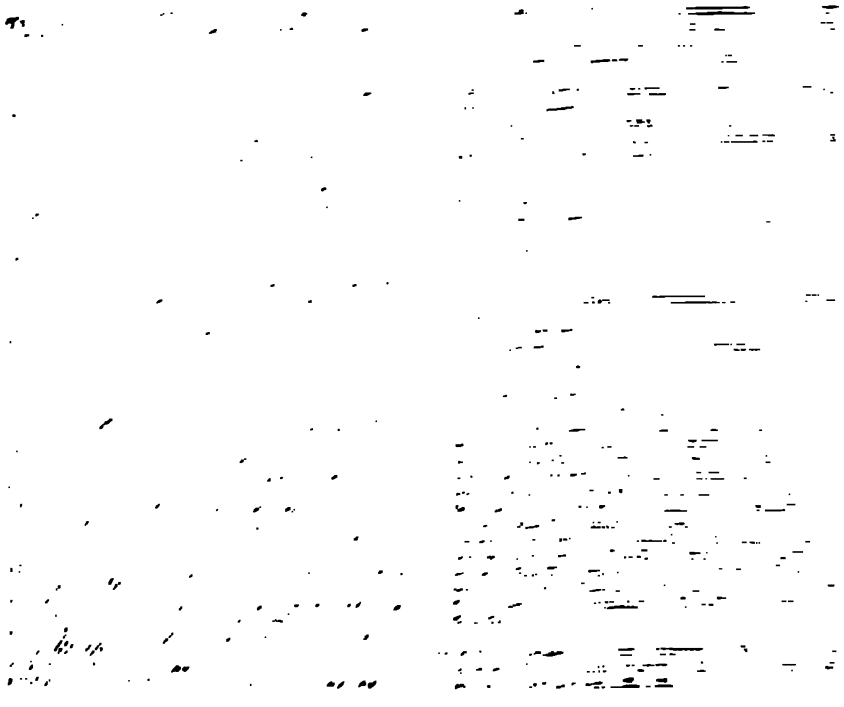
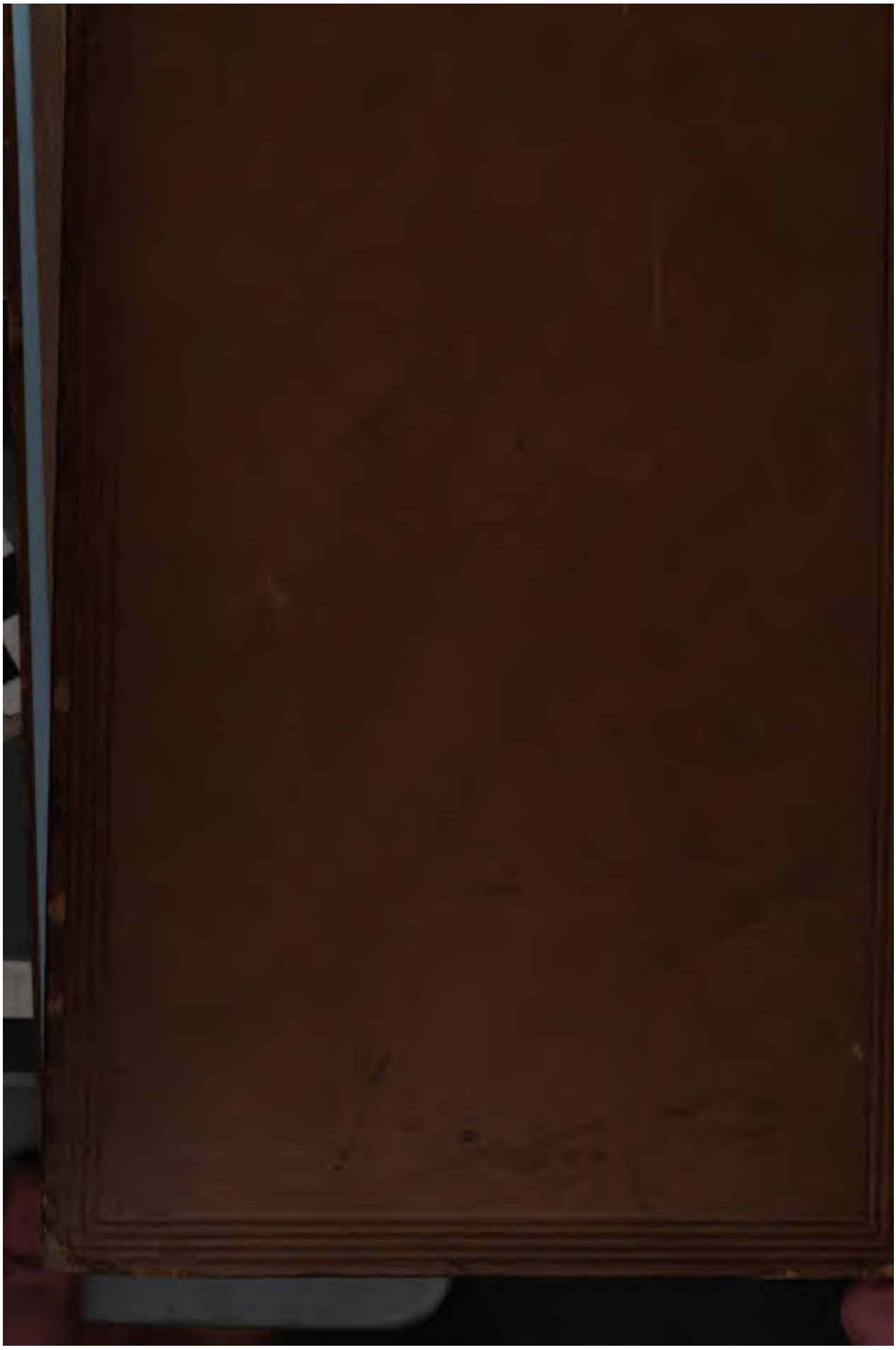
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